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DRIFT-PLATTEVILLE AQUIFER
NORTHERN AREA REMEDIAL INVESTIGATION PLAN
FOR THE REILLY TAR & CHEMICAL CORPORATION
N.P.L. SITE, ST. LOUIS PARK, MINNESOTA

ERT®

A RESOURCE ENGINEERING COMPANY

ERT Document No.: PE317-600

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FOR THE REILLY TAR & CHEMICAL CORPORATION
N.P.L. SITE, ST. LOUIS PARK, MINNESOTA**

November 3, 1986

Amended February 1987

Amended October 1987

Prepared for:

**The City of St. Louis Park
St. Louis Park, Minnesota 55416**

**ERT - A RESOURCE ENGINEERING COMPANY
5871 Cedar Lake Road, St. Louis Park, Minnesota 55416**

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Section A - Site Management Plan

Section B - Quality Assurance Project Plan

Section C - Health & Safety Plan

Section D - Community Relations Plan

SECTION A
SITE MANAGEMENT PLAN

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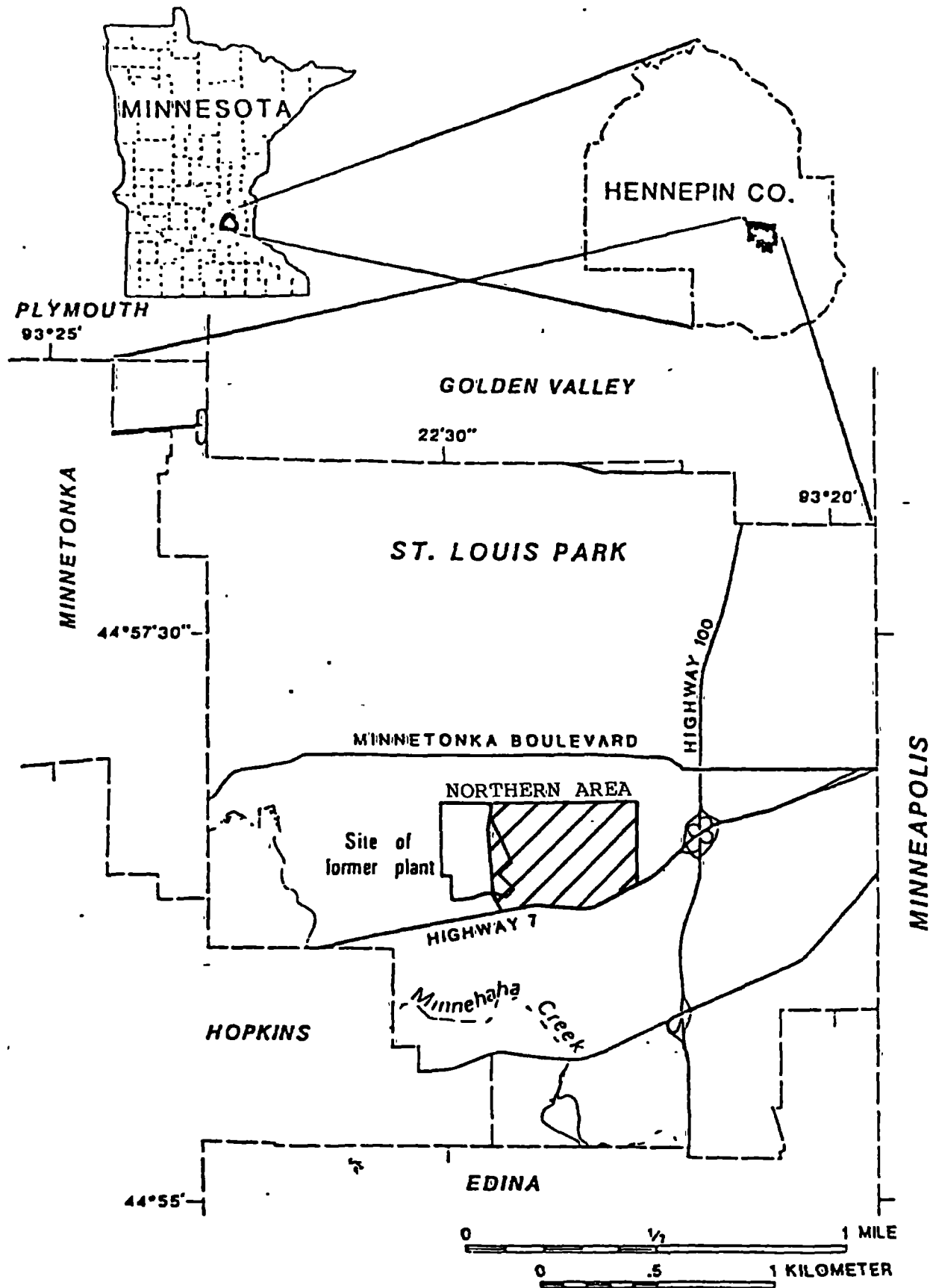
PURPOSE AND SCOPE

The purpose of this Remedial Investigation is to determine the nature and extent of ground-water contamination in the Drift-Platteville Aquifer within a prescribed area in the vicinity of the former Reilly Tar & Chemical Corporation site in St. Louis Park, MN, and to gather pertinent data necessary for the completion of a Feasibility Study. The prescribed area of the Drift-Platteville Aquifer is referred to as the Northern Area and is bounded by West 32nd Street to the north, Alabama Avenue to the east, Highway 7 to the south, and Louisiana Avenue to the west (Figure 1). The existence of ground water contamination has long been known, but its extent has not been fully determined at this time. During the course of settlement negotiations in *United States of America, et al. v. Reilly Tar & Chemical Corporation et al.*, an evaluation of existing data led to the agreement embodied in the Consent Decree and Remedial Action Plan (RAP). It was agreed that the final Remedial Action(s) for the Drift-Platteville Aquifer could not be precisely defined without further limited investigations. During the Remedial Investigation, six new monitoring wells will be installed and a ground water monitoring program will be conducted as per the RAP. A Feasibility Study will be conducted at the conclusion of this Remedial Investigation. The Feasibility Study will identify and evaluate remedial action alternatives for limiting the further spread of contamination located within the study boundaries. The Remedial Actions that may be required include the installation and operation of gradient control well systems consisting of one or more gradient control wells.

To accomplish this Remedial Investigation, seven tasks will be addressed:

- Task 1 Description of Current Situation
- Task 2 Plans and Management
- Task 3 Site Investigation
- Task 4 Site Investigation analysis
- Task 5 Laboratory and Bench-Scale Studies
- Task 6 Reports
- Task 7 Community Relations Support

This Remedial Investigation will follow U.S. EPA "Guidance on Remedial Investigation Under CERCLA" (dated June 1985) in order to meet the requirements of the Consent Decree and RAP. However, in following said guidance, the City of St. Louis Park relinquishes no rights granted it under the applicable Parts of the Consent Decree.



(From USGS Water Supply Paper 2211)

FIGURE 1
LOCATION MAP

TASK 1 DESCRIPTION OF CURRENT SITUATION

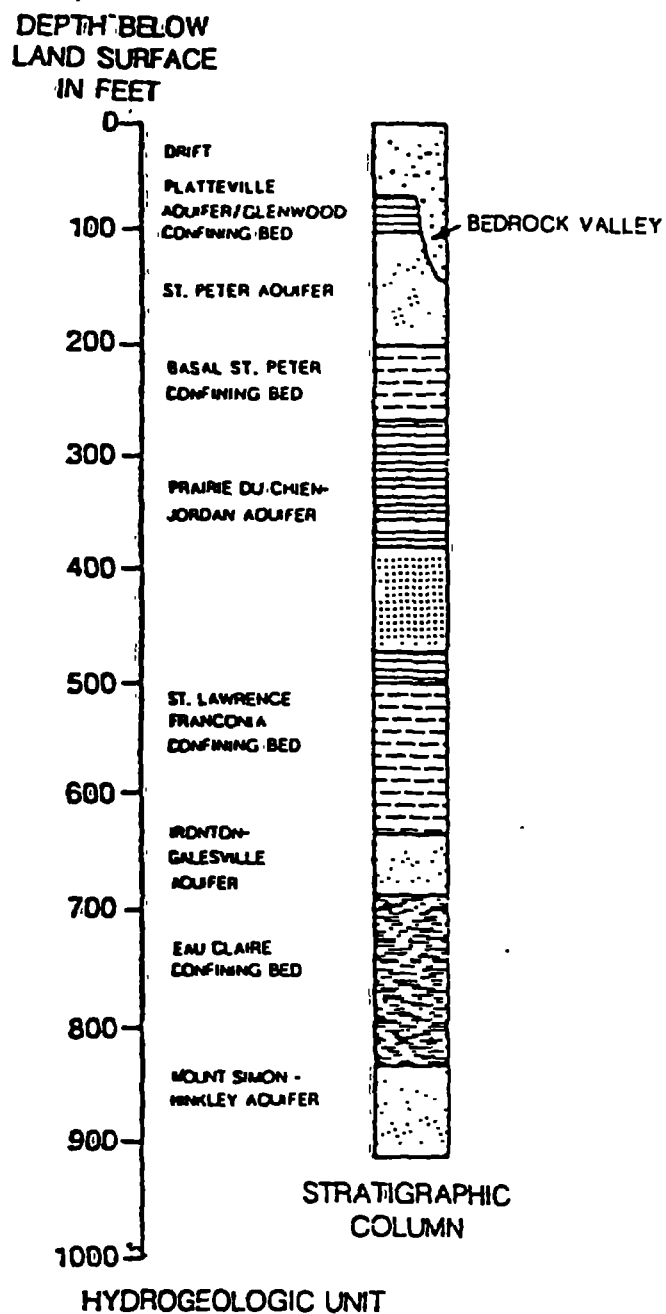
Background and Nature and Extent of Problem

The former Reilly site occupies 80 acres in St. Louis Park (Figure 1). A coal tar refinery and wood preserving plant was operated at the site from 1917 to 1972. In 1972 the site was sold and converted to residential and recreational uses. Also Louisiana Avenue, a divided four lane avenue and storm sewer improvements were constructed on the site. Soil and surficial ground-water contamination by a variety of coal-tar-related chemicals have been observed in the immediate vicinity of the former plant site. In addition, polynuclear aromatic hydrocarbons (PAH), which are constituents of creosote and coal tar, have been measured in some of the bedrock aquifers in the St. Louis Park area.

The area defined by the boundaries of the Northern Area Remedial Investigation is primarily residential, although schools occupy a large land area. The area is higher in elevation than the former Reilly site, therefore this area did not receive runoff from the Reilly site. The western boundary of the Northern Area is Louisiana Avenue which was built on the site. Therefore, a portion of the original 80 acre Reilly site is included in the Northern Area.

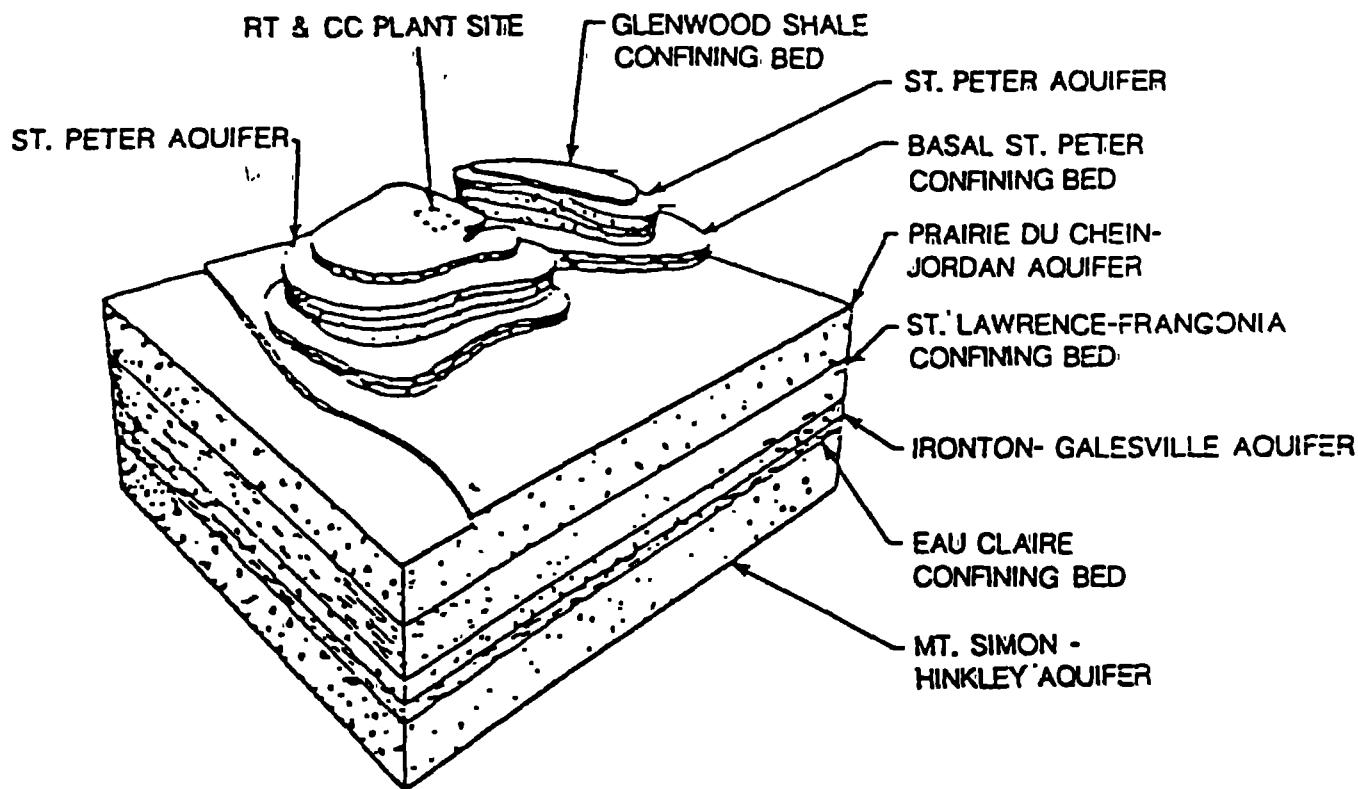
The relationship between the Drift-Platteville Aquifer and other bedrock units is shown in Figures 2 and 3. At the former Reilly plant site, approximately 65 feet of Drift and 25 feet of Platteville Limestone overlie the Glenwood Shale confining bed. In the vicinity of the former Reilly site, within the City of St. Louis Park, the Platteville and Glenwood bedrock units have been removed by erosion, and the Drift directly overlies the St. Peter Aquifer (Figure 4). The Drift consists of sands and gravel (Middle Drift) which are sometimes overlain by lacustrine deposits (e.g., peat and organic clay in the bog area south of the former Reilly site) and underlain by till, outwash, valley-fill deposits and weathered bedrock (U.S. Geological Survey Water Supply Paper 2211).

The locations of wells completed in the Drift-Platteville Aquifer are shown in Figures 5 and 6. Table 1 includes the available well logs for these wells. Water level measurement in the Drift-Platteville Aquifer indicate a predominantly eastward direction of ground-water flow with a slight southern component. Figure 7 is reproduced from the U.S. Geological Survey Water Supply Paper 2211, and based on the 10-foot contour interval used, only an eastward flow direction can be surmised for the Drift Aquifer (June 5, 1979 data). Water Supply Paper 2211 also concludes that flow in the Middle Drift is primarily horizontal. More recent water level measurements by the Minnesota Pollution Control Agency (MPCA) are plotted in Figures 8 and 9 and tabulated in Table 2. These data, collected during winter conditions, show a slight southern component to the regional pattern of ground-water flow in both the Middle Drift and Platteville Aquifers. The Platteville Aquifer flow pattern is being



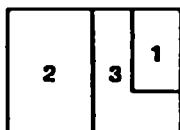
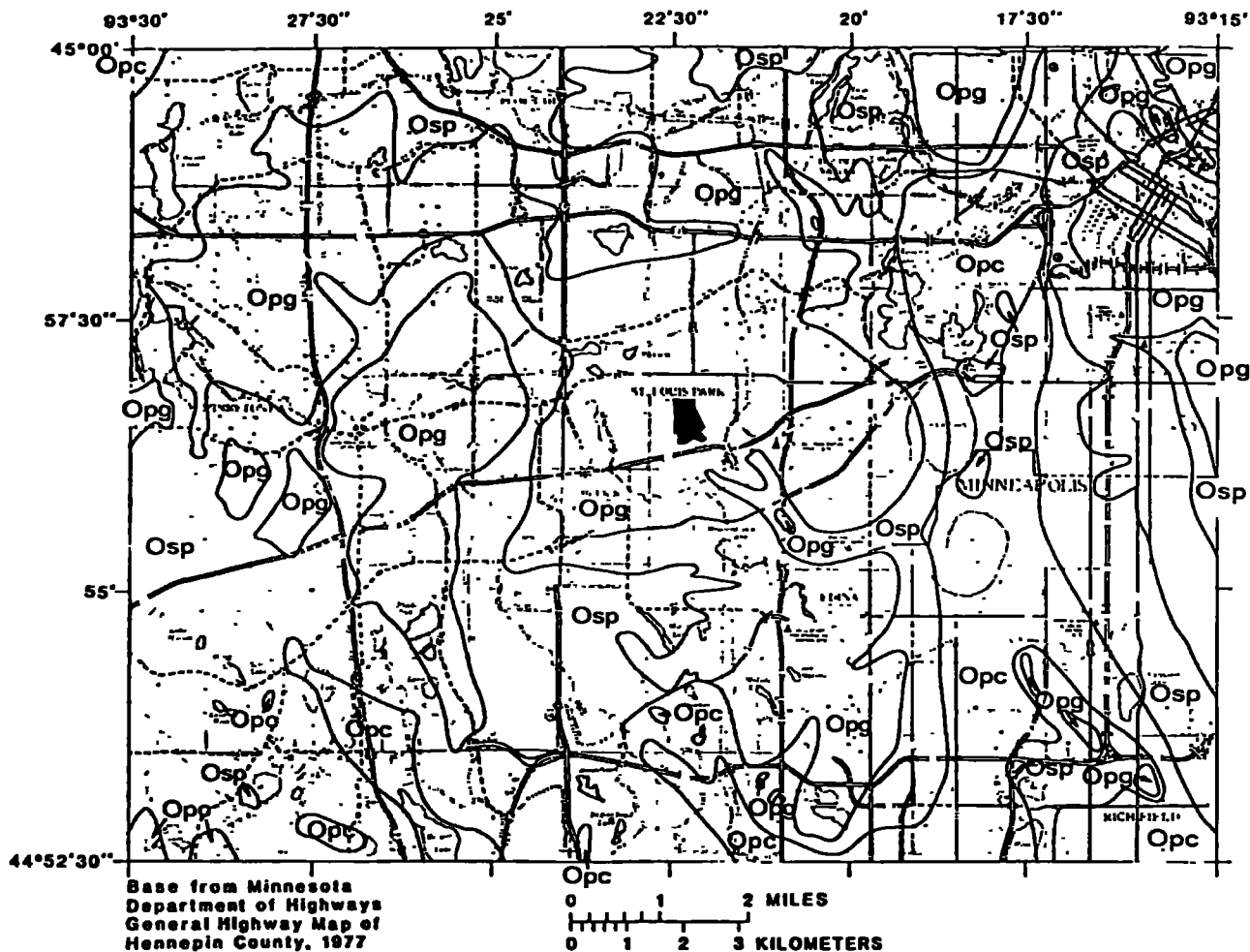
(Illustration Modified From Record of Decision, May 25, 1984.)

FIGURE 2
STRATIGRAPHIC
PROFILE



(Illustration From Record of Decision, May 25, 1984.)

FIGURE 3
GEOLOGY BENEATH
DRIFT-PLATTEVILLE
AQUIFER



1. Modified from Norvitch, R. F., and Walton, M. S., 1979, U. S. Geological Survey Miscellaneous Investigations Map I-1157

2. Modified from Minnesota Geological Survey, Unpublished Map

3. This study

INDEX TO GEOLOGIC MAPPING

EXPLANATION

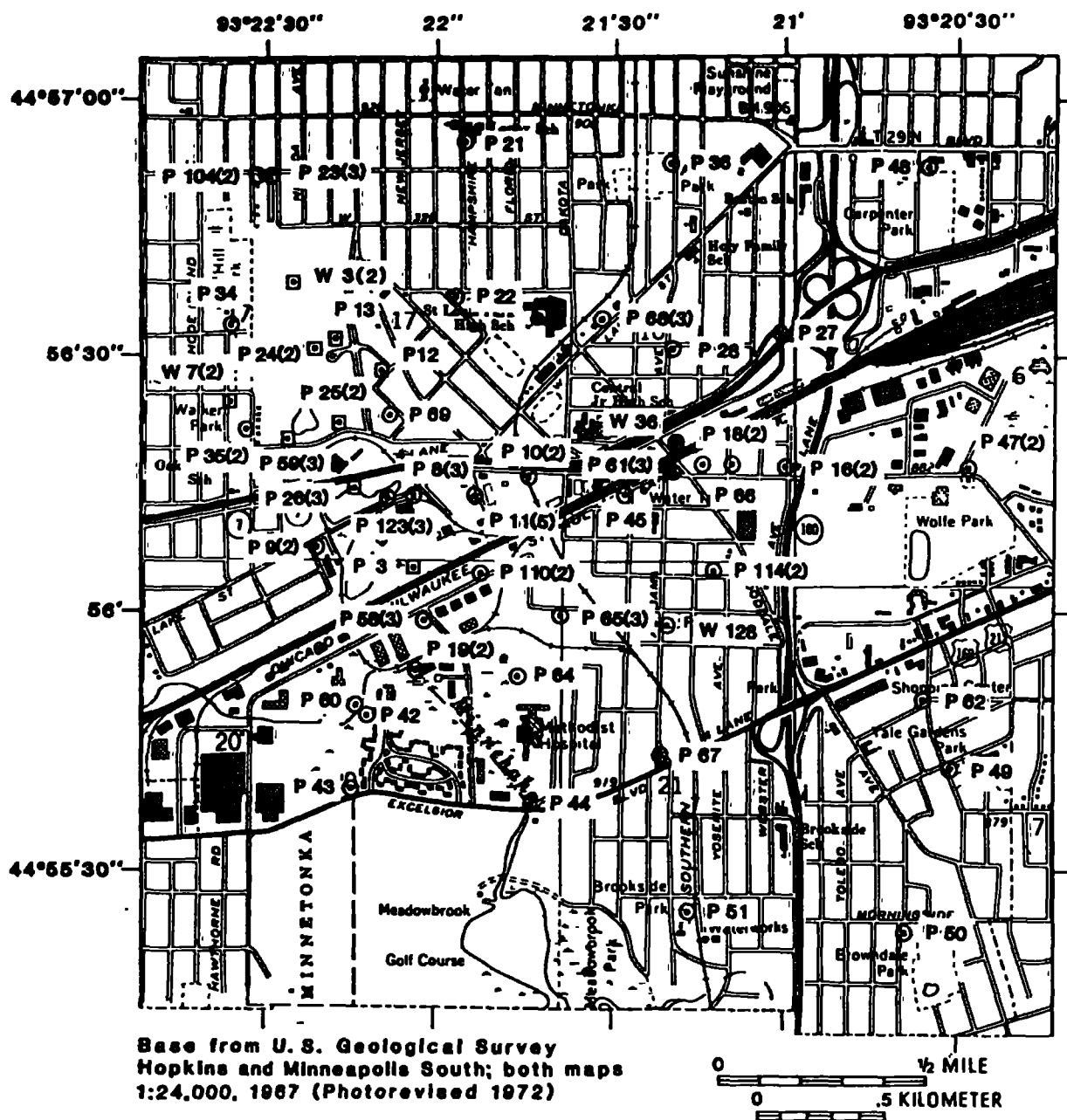
CORRELATION OF MAP UNITS

Opg	Platteville and Glenwood Formations, undivided	ORDOVICIAN
Osp	St. Peter Sandstone	
Opc	Prairie du Chien Group	

— Approximate geologic contact

■ Site of former plant

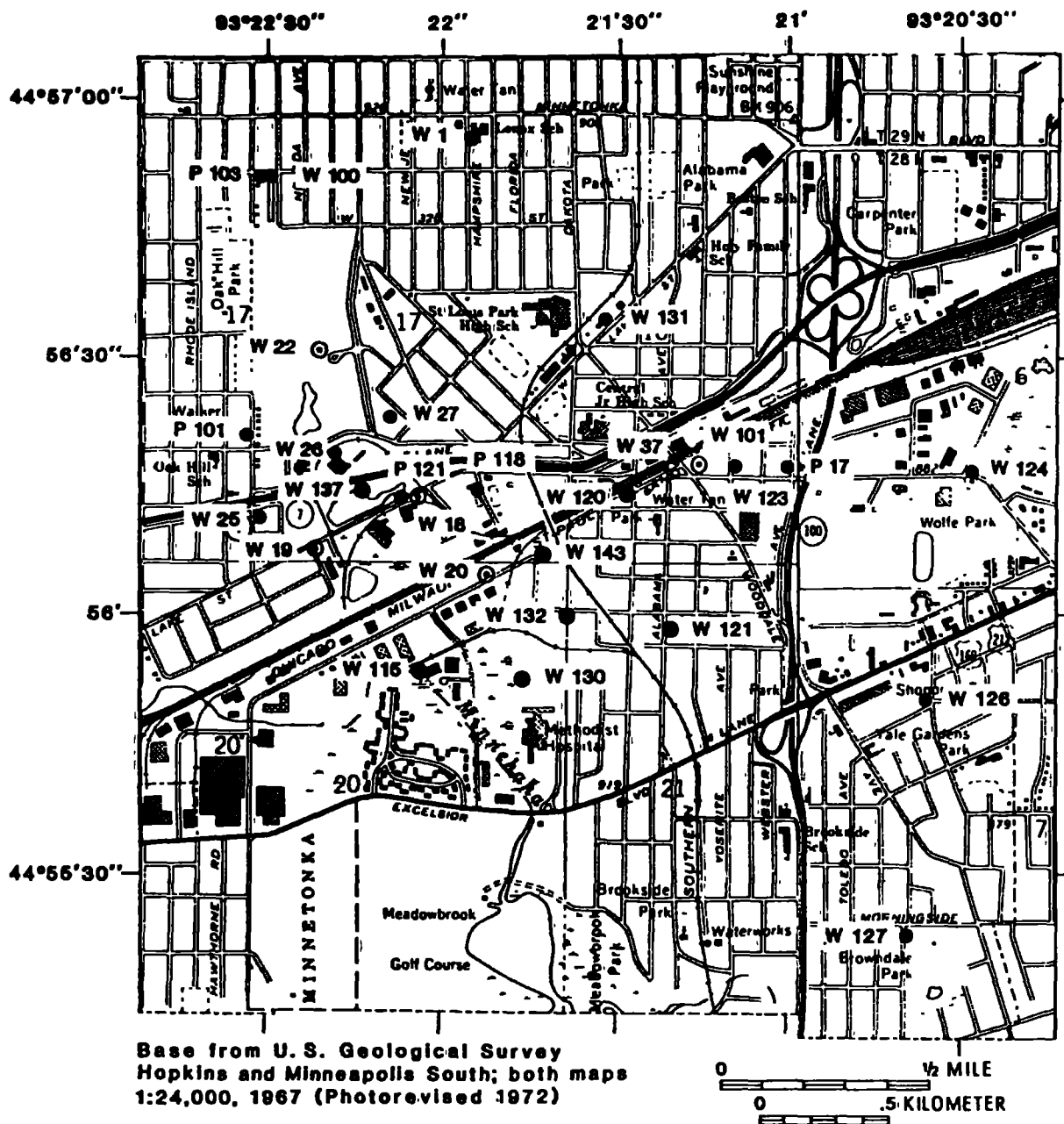
Figure 4. Preliminary Bedrock Geology (WSP 2211)



EXPLANATION

- P11(5) Location and project well number. At clusters where more than one well is completed in drift, the project well number of the shallowest well is shown and the total number of wells completed in drift at that location is shown in parentheses.
- ◻ P59(3) Square indicates that one or more wells at cluster have been permanently sealed, damaged, or destroyed.

Figure 3 Location of Observation Wells Completed in the Drift.



EXPLANATION

- W 27 Location and project well number of well completed in Platteville aquifer
- ⊙ W 101 Water level monitored with digital recorder during all or part of 1978-81

Figure 6 Location of observation wells completed in the Platteville aquifer

Table 1. Data on selected wells in the St. Louis Park area, Minnesota

Township and range: First three (or two) digits indicate township north of the baseline; next two digits indicate range north of the principal meridian; last digit(s) indicate(s) section in which well is located. Letters indicate well location in section. First letter denotes the 160-acre tract; second letter denotes the 40-acre tract; third letter denotes the 10-acre tract. Letters are assigned counterclockwise beginning with the northeast quarter. Consecutive numbers beginning with 1 are added as suffixes to distinguish wells within a given 10-acre tract.

Site identification (lat and long): First six digits are latitude of well location in degrees, minutes, and seconds; next seven digits are longitude in degrees, minutes, and seconds; last two digits are arbitrarily assigned to distinguish wells within a given 1-second by 1-second area.

Reported log: Qd, drift, undifferentiated; Opl, Platteville Limestone; Ogl, Glenwood Shale; Osp, St.

Peter Sandstone, undifferentiated; Ospl, St. Peter Sandstone, lower siltstone beds; Opc, Prairie du Chien Group; Cj, Jordan Sandstone; Cal, St. Lawrence Formation; Cf, Franconia Sandstone; Cig, Ironston and Galesville Sandstones; Cc, Eau Claire Sandstone; Cm, Mount Simon Sandstone; pCh, Hinckley Sandstone.

Altitude: When MP is given, altitude is for measuring point, not land surface.

Field measurement status: A, well field located and permanently sealed or reconstructed; AH, well field located and permanently sealed by MDH; AR, well reported permanently sealed; BR, well reported filled; D, well field located and contains debris; F, well field located; G, well field located and geophysically logged; M, mass-measurement well (measured 2 to 3 times per year); O, observation well (measured every 2 to 3 weeks); P, well field located and has pump; X, well destroyed.

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 --- AAB1.	445654093215501	216030	W1	Monitoring well --- E. H. Renner		03-76	0-102 Qd 102-107 Opl	922.76 MP	107	4 in. 0-102	Opl	43.67	11-28-78	O
117.21.17 --- BAC1.	445651093222901	216031	W2	--- do --- do ---		03-76	0-36 Qd	897.14 MP	36	4 in. 0-32	Qd	10.40	11-28-78	O
117.21.17 --- BDB1.	445637093222401	216032	W3	--- do --- do ---		05-76	0-52 Qd	897	52	4 in. 0-49	Qd	7	05-10-76	D,X
117.21.17 --- CAD2.	445622093221901	216033	W5	--- do --- do ---		02-76	0-26 Qd	891.72 MP	26	4 in. 0-21	Qd	6.59	11-28-78	O
117.21.17 --- CAC1.	445620093222601	216034	W6	--- do --- do ---		02-76	0-26 Qd	892.74 MP	26	4 in. 0-22	Qd	7.39	11-28-78	O
117.21.17 --- CBD1.	445625093223601	216035	W7	--- do --- do ---		03-76	0-71 Qd	930	71	4 in. 0-66	Qd	35	03-02-76	D,X
117.21.17 --- CDD1.	445607093222101	216036	W8	--- do --- do ---		02-76	0-31 Qd	892.87 MP	31	4 in.	Qd	7.96	11-28-78	O
117.21.17 --- DCA1.	445614093220301	216037	W9	--- do --- do ---		02-76	0-25 Qd	891.21 MP	25	4 in. 0-20	Qd	7.13	11-27-78	O
117.21.20 --- ABD1.	445559093220201	216038	W10	--- do --- do ---		02-76	0-29 Qd	891.82 MP	29	4 in. 0-25	Qd	7.63	11-27-78	O
117.21.17 --- DDB2.	445614093215301	216039	W11	--- do --- do ---		11-76	0-23 Qd	897.20 MP	23	4 in. 0-19	Qd	13.63	11-27-78	O
117.21.17 --- DDA1.	445613093214001	216040	W12	--- do --- do ---		12-76	0-47 Qd	919.26 MP	47	4 in. 0-42	Qd	37.02	11-27-78	O
117.21.17 --- DCB1	445615093220901	216041	W13	--- do --- do ---		11-76	0-50 Qd	890.40 MP	50	4 in. 0-45	Qd	6.19	11-28-78	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 --- DCA2	445614093220302	216042	W14	do	do	02-77	0-68 Qd 68-82 Opl 82-85 Ogl 85-95 Osp	891.41 MP	95	8 in 0-69 4 in. 0-86	Osp	23.75	11-27-78	G,O
117.21.17 --- CAC2.	445621093222601	216043	W15	do	do	04-77	0-76 Qd	892.47 MP	76	4 in.	Qd	8.30	11-28-78	O
117.21.20 --- ABD2	445559093220202	216044	W16	do	do	04-77	0-73.5 Qd	892.07 MP	64	4 in. 0-61	Qd	8.56	11-27-78	O
117.21.17 --- DDB3.	445614093215302	216045	W17	do	do	04-77	0-69 Qd	897.07 MP	69	4 in. 0-66	Qd	14.05	11-27-78	O
117.21.17 --- DCA3.	445614093220303	216046	W18	do	do	1978	0-68 Qd 68-78 Opl	893.23 MP	78	4 in. 0-68	Opl	9.86	11-27-78	O
117.21.17 --- CDD2.	445607093222102	216047	W19	do	do	1978	0-72 Qd 71-81 Opl	894.43 MP	81	4 in. 0-81	Opl	11.22	11-28-78	O
117.21.20 --- AAB1.	445605093215101	216048	W20	do	do	1978	0-69 Qd 69-80 Opl	895.55 MP	80	4 in. 0-70	Opl	14.01	11-27-78	O
117.21.20 --- ABD3.	445559093220203	216049	W21	do	do	1978	0-87 Qd 87-92 Osp	892.60 MP	92	4 in. 0-92	Osp	24.27	11-27-78	O
117.21.17 --- GAA1.	445630093222101	200993	W22	Republic Creosote Washroom Well.	do	12-47	0-65 Qd 65-91 Opl 91-91 Osp	896.16 MP	91	4 in. 0-71	Originally Opl-Osp Now Opl.	11.44	11-28-78	G,O
117.21.17 --- CAD1.	445625093221601	216050	W23	Republic Creosote Site "Hinckley" well on site, Cooling well.	McCarthy	12-17 to 05-18.	0-60 Qd 60-95 Opl 95-195 Osp 195-258 Ospl 258-372 Opc 372-457 Cj 457-507 Csl 507-835 Cf-Ce 835-909 Cm	894.49 MP	909	12 in. 0-65 10 in. 0-257 7 in. < 230-373	Originally Cj, Csl, Cf, Cig, Ce, Cm Now Osp, Opc, Cj, Csl, Cf.	33.15	11-28-78	G,O
117.21.20 --- ABB1.	445604093220501	160018	W24	Monitoring well	E. H. Renner	1978	0-81 Qd 81-83 Opl 83-86 Ogl 86-90 Osp	892.92 MP	90	8 in. 0-81.5 4 in 0-86.7	Osp	22.84	11-27-78	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 --- CDC2.	445610093222602	206448	W25	Lakeland Door	do	11-50	0-79 Qd 79-85 Opl	888.79 MP	85	3 in. 0-79	Opl	4.39 9	10-15-78 11-01-50	G,O
117.21.17 --- CDA1.	445619093221801	209344	W26	Mill City Plywood	do	08-52	0-59 Qd 59-90 Opl	891.45 MP	90	4 in. 0-76	Opl	6.90 3.5	10-13-78 08-05-52	G,O
117.21.17 --- DBC1.	445624093220801	216052	W27	Terry Excavating	do	1953	0-80 Qd 80-100 Opl 100-112 Osp	905	112	4 in.	Opl-Osp	30	1953	G,O
117.21.17 --- CDB1.	445619093222501	216053	W28	7401 Walker St.		Before 1939	---	895	---	---	---	---	---	X
117.21.20 --- BAA2.	445604093223801	206454	W29	Flame Industries	E. H. Renner	04-63	0-73 Qd 73-90 Opl 90-94 Ogl 94-202 Osp 202-251 Ospl 251-335 Opc	897	335	10 in. 0-77 8 in. 0-257	Opc	68	04-12-63	P
117.21.17 --- CCA2.	445614093223801	216054	W30	3636 Quebec Ave.	do	About 1940	---	935	200	6 in. 0-100	Opl-Osp	---	---	AH
117.21.20 --- BBB1.	445600093224901	216055	W31	3831 Texas Ave.		About 1949	---	905	---	---	---	---	---	---
117.21.07 --- DDD1.	445702093225401	203190	W32	Texatanka Shopping Center.	E. H. Renner	08-51	0-98 Qd 98-112 Opl 112-117 Ogl 117-228 Osp 228-283 Ospl 283-405 Opc 405-466 Cj	925	466	8 in. 0-283.5	Opc-Cj	80	08-00-51	F
117.21.17 --- DDB1	445614093214901	206449	W33	Strand Mfg., Wayne Register, Mideo Register, Robinson Rubber.	Max Renner	06-53	0-80 Qd 80-100 Opl 100-102 Ogl 102-182 Osp	906.37 MP	182	8 in.	Opl-Osp Osp (from 6-79).	23.62 45.97	11-27-78 07-10-79	P,G
117.21.16 --- CAA1.	445627093213601	216056	W34	Cnb Diaper Service, Sterilized Diaper Service.	Bergerson-Caswell	05-67	0-93 Qd 93-107 Opl 107-113 Ogl 113-212 Osp 212-280 Ospl 280-342 Opc	918	342	6 in. 0-292	Opc	99.1	11-08-78	AH,G

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.16 --- DAA1.	445625093210301	216057	W35	Burdick Grain Co. ---	-----	About 1910	---	912	---	4 in.	Opl(?)—Osp(?)	51.6	10-20-78	P,M
117.21.16 --- DBD1.	445620093211901	216058	W36	Dayton Rogers --- Well #1.	-----	Before 1947	---	908	---	3 in	Qd	31.77	10-25-78	F,O
117.21.16 --- DBD2.	445619093211801	216059	W37	Dayton Rogers --- Well #2.	Laurel --- Hansmann	03-73	---	910	120	6 in.	Opl	36.03	10-25-78	O,G
117.21.16 --- CDB1.	445618093211801	216060	W38	Milwaukee --- Railroad Well.	-----	1913	0-107 Qd 107-111 Opl 111-260 Osp 260-405 Opc 405-485 Cj 485-515 Cal 515-1002 Cf-pCh	914	1002	---	Opl-pCh	---	---	---
117.21.16 --- DCA3.	445613093212201	216061	W39	3612 Alabama Ave. ---	-----	---	---	910	---	---	Osp	---	---	X
117.21.16 --- CDB2.	445615093211601	206444	W40	Minnesota Rubber ---	-----	1963	0-125 Qd 125-205 Osp 205-276 Ospl 276-378 Opc	910	378	8 in. 0-205	Osp-Opc	---	---	P
117.21.16 --- DCC3.	445611093213401	216062	W41	Hartmann #1 --- 3700 Colorado.	E. H. Renner ---	---	---	912	160	2 in.	Osp(?)	---	---	D
117.21.16 --- DCC1.	445611093213401	216063	W42	Hartmann #2 --- 3700 Colorado.	-----	---	---	912	60	---	---	---	---	---
28.24.7 --- BBC1.	445559093210301	200541	W44	King's Inn, --- Lilac Lane Bowling Alley.	Max Renner ---	12-51	0-111 Qd 111-131 Opl 131-259 Osp	910	259	8 in. 0-111	Opl-Osp	47	1951	P
117.21.16 --- CDA1.	445618093210001	206445	W45	S-K Products, --- Inc.	Don Stodola's Well Drilling.	07-63	0-92 Qd 92-94 Opl 94-122 Ogl 122-224 Osp 224-265 Ospl 265-312 Opc	900	312	8 in. 0-? 6 in 0-244	Ospl-Opc	84	07-25-78	P
117.21.16 --- CDA2	445617093210201	216065	W46	--- do --- do	---	1973	0-92 Qd 92-94 Opl 94-122 Ogl 122-224 Osp 224-265 Ospl 265-312 Opc	905	305	6 in. 0-234	Ospl-Opc	95	02-16-73	P

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
28.24.6 ---- AAC1.	445647093195301	216066	W47	Belco; Burdick Grain Co.	-----	Before 1942	---	891	---	8 in.	Opl-Cj	16.39	12-06-78	G,A
117.21.20 --- ADA2.	445646093214601	216067	W48	Methodist Hospital.	McCarthy	-----	0-85 Qd 85-94 Opl 94-257 Osp 257-377 Opc 377-466 Cj 466-485 Cal	889.8	485	20 in. 0-255	Ospl(?) Opc-Cal	68.82	12-06-78	G,P
117.21.17 --- DDD1.	445607093214101	206540	W49	Strom Block, deep well.	E. H. Renner	-1958	0-72 Qd 72-92 Opl 92-96 Ogl 96-260 Osp 260-381 Opc 381-384 Cj	900	384	8 in. 0-77 6 in. 0-241	Ospl-Cj	65	09-00-58	---
117.21.17 --- DCD1.	445609093215801	216068	W50	Prestolite	-----	Before 1937	---	890	---	---	---	---	---	G,AH
117.21.20 --- BAA1.	445605093221601	216069	W51	Androc Chemical Co.	-----	-----	---	892	---	4 in.	Opl	---	---	G,AH
117.21.20 --- BCA1.	445548093223701	216070	W52	Merit Gage Co.; Suburban Sanitary Drainage.	E. H. Renner	-09-61	0-81 Qd 81-95 Opl 95-97 Ogl 97-110 Osp	920	---	4 in. 0-82	Opl-Osp	30	09-29-61	G,AH
28.24.6 ---- BDB2.	445638093204001	216071	W53	Northland Aluminum.	-----	-----	---	884	---	---	---	84.10	06-22-79	F
117.21.19 --- AAD1.	445553093225401	216072	W54	Old Galachirche residence.	-----	-----	---	920	---	6 in.	---	---	---	---
117.21.20 --- BBA1	445605093223501	216073	W55	7612 Division St.	E. H. Renner	-01-59	0-99 Qd 99-118 Opl	915	118	4 in. 0-102	Opl	36	1959	---
117.21.17 --- CCB1.	445619093224201	216074	W56	Earlison residence	-----	-----	---	935	---	4 in	---	---	---	---
117.21.17 --- CCA1.	445619093223801	216075	W57	Oak Hill School	-----	Before 1940	---	935	---	---	---	---	---	---
117.21.17 --- DBB1.	445628093221101	216077	W59	On site east of Louisiana Extension.	-----	-----	---	---	24	6 in. 0-15	Qd	---	---	AH

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21 17 --- CCA3.	445614093224001	216078	W60	3645 Rhode Island -- E. H. Renner Ave.	-----	---	---	935	250	6 in.	Opl-Osp	---	---	AH
117.21.17 --- DDD3.	445607093214001	216079	W61	William V. Terry	-----	---	---	905	---	---	---	---	---	---
117.21.8 ---- CAA1.	445721093221801	206438	W62	McCourtney ----- do -----	09-66	0-86 Qd 86-103 Opl 103-105 Ogl 105-274 Osp 274-394 Opc	---	910	394	12 in. 0-90 10 in 0-246	Ospl-Opc	88	09-08-69	P
117.21.20 ---- CBB1.	445538093224501	216080	W63	National Foods ---- McCarthy	09-45	---	---	910	285	10 in. inside 12 in.	---	75	09-00-45	P
117.21 17 --- DDD4	445607093214202	206451	W65	Ace Manufacturing - E. H. Renner Strom Block.	09-58	0-77 Qd 77-93 Opl 93-95 Ogl 95-109 Osp	---	904	109	4 in. 0-77	Opl-Osp	24.68	12-01-78	F
117.21 19 --- ABA2.	445559093220502	216081	W66	Black Top Service, - ---- do -----	01-56	0-65 Qd 65-86 Opl 86-87 Ogl 87-251 Osp 251-280 Opc	---	899	280	6 in.	---	---	---	BR
117.21.19 --- ABA1.	445559093220501	216082	W67	Black Top Service, - ---- do -----	12-55	0-78 Qd 78-84 Opl 84-85 Ogl 85-105 Osp	---	812	105	3 in. 0-84	Opl(?)—Osp	25	12-29-55	---
117.21.20 --- BAC1.	445604093223001	206447	W68	Bergeson ----- Aamot -----	12-61	0-95 Qd	---	900	110	2 in. 0-90	Qd	40	12-00-61	P
28.24.6 ---- CAA1.	445614093203601	216083	W69	Hedberg-Friedheim - Max Renner Block Co.; Wolfe Lake Augmentation Well.	07-47	0-71 Qd 71-78 Opl 78-81 Ogl 81-246 Osp 246-327 Opc	---	890	327	---	---	65	1947	G
28.24.6 ---- BAA1	445653093202601	200539	W70	Park Theatre ----- do -----	09-39	0-74 Qd 74-104 Opl 104-229 Osp 229-358 Opc 358-398 Cj	---	905	398	10 in. 0-74 8 in. 0-229	Opc-Cj	46	1939	P

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
28.24.07 ---- CAB1.	445535093203401	200543	W71	Cairns residence ---- do ----		03-58	0-70 Qd 70-86 Opl	880	86	4 in. 0-70	Opl	16	03-00-58	---
28.24.07 ---- DBA1.	445533093200701	216085	W72	Harder residence ---- Pederson ----		12-58	0-138 Qd 138-153 Osp	925	153	---	Osp	---	---	---
117.21.19 --- ACA.	---	216086	W73	Jasperson Dairy ---- E. H. Renner ----		05-52	0-87 Qd 87-114 Opl 114-120 Ogl 120-144 Osp	915	144	6 in. 0-90.3	Opl-Osp	22	05-22-52	---
117.21.08 --- CAA1.	445721093221801	216087	W74	Landers Gravel ---- McCarthy ----		09-21	0-82 Qd 82-100 Opl 100-265 Osp 265-280 Opc	890	280	---	Opl(?) Osp(?)—Opc	31	09-00-21	AR
28.24.6 ---- BDB1.	445639093203201	216089	W75	Park Pet Hosp. ---- Max Renner ----		1951	0-67 Qd 67-130 Opl—Osp	884	130	6 in. 0-67	Opl-Osp	33.51	12-11-78	P
28.24.06 ---- ABC1.	445644093202101	216090	W76	Professional Instruments. ---- do ----		1946	---	882	184	6 in.	Opl(?)—Osp	---	---	P
117.21.19 --- CBD1.	445608093240301	216093	W80	Red Owl ----- Keys -----		10-46	0-99 Qd 99-117 Opl 117-279 Osp 279-397 Opc 397-502 Cj	920	502	16 in. 0-279 12 in. 0-304	Opc	70	10-03-46	---
29.24.30 ---- BCC1.	445916093205101	201039	W82	Weldwood Nursing - Bergeson- Caswell. ----		10-57	0-56 Qd 56-67 Opl 67-235 Osp 235-348 Opc 348-444 Cj	878	444	12 in. 0-56 6 in. 0-348	(?)—Cj	50	11-07-57	---
29.24.29 ---- CBG1.	445808093103901	201014	W86	Prudential Insurance Co. No. 1 ---- Layne ----		07-54	0-243 Qd 243-257 Osp 257-383 Opc 383-467 Cj 467-470 Csl	925	470	16 in. 0-259	Opc—Csl	78	07-00-54	---
117.21.17 --- BAC2.	445651093222902	149710	W100	Monitoring well ---- E. H. Renner ----		12-78	0-73 Qd 73-88 Opl	910	88	4 in. 0-73	Opl	13.03	12-26-78	O
117.21.16 --- CDB2.	445617093211501	149711	W101	Monitoring well ---- do ----		12-78	0-100 Qd 100-106 Opl	910	106	4 in. 0-103	Opl	52.41	12-26-78	G.O
-----	---	216102	W104	Rice Gravel & Sand - -----		1935	---	---	250	12 in.	Opc(?)	---	---	---

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 --- CA1.	---	2009797	W105	Minnesota Sugar Beet Co.	Swenson	1899	0-73 Qd 73-93 Opl 93-260 Osp 260-385 Opc 385-504 Cj 504-950 Csl-Cm	892	950	---	Opl-Cm(?)	---	---	---
28 24 6 ----- CAA2	445614093204102	216103	W106	Hedberg, Friedheim & Co.		Before 1936	0-90 Qd 90-100 Opl 100-230 Osp	900	230	---	Opl(?)—Osp	---	---	---
28.24 06 ----- BCD1.	445634093204101	216104	W107	Intenor Elevator Co., Salem Ave. and Chicago & Milwaukee Rail Road tracks.		About 1893	0-75 Qd 75-100 Opl 100-250 Osp 250-390 Opc 390-495 Cj 495-710 Cl-Cf 710-755 Cig	875	755	---	Opl(?)—Cig	---	---	---
117.21.21 --- BAB1.	445605093211201	216029	W108	5800 Goodrich	E. H. Renner	Before 1936	---	---	---	---	---	---	---	---
117.21.09 --- CDC1.	445658093211201	216105	W109	Max Renner's Shop.	Max Renner	Before 1936	0-93 Qd 93-113 Opl 113-118 Osp	925	118	---	Opl(?)—Osp	---	---	---
117.21.16 --- CGD1.	445609093212501	216107	W111	6030 Oxford St.	do	Before 1936	0-190 Qd 190-240 Osp	919	240	---	Osp	---	---	G
117.21.16 --- CCA1.	445615093212301	206443	W112	Old St. Louis Park Well #1.	McCarthy	05-32	0-109 Qd 109-274 Osp 274-398 Opc 398-486 Cj 486-540 Csl	917.52	540	16 in. 0-212 12 in. 194-274	in 1932 Opc-Csl in 1978 Opc	77	12-21-78	G,M
117.21.8 ----- DCB3.	445701093215803	206440	W113	St. Louis Park No 3.	do	08-39	0-103 Qd 103-118 Opl 118-286 Osp	922	286	24 in. 0-103	Opl—Osp	60	08-00-39	P
28 24.6 ----- CAA3	445614093204103	216108	W114	Hedberg, Friedheim & Co.	E. H. Renner	Before 1936	0-60 Qd 60-80 Opl 80-249 Osp	887	249	---	Opl(?)—Osp	---	---	F
117 21 20 --- ABD1.	445554093220301	216109	W115	Monitoring well	Bergerson-Caswell.	02-79	0-65 Qd 65-78 Opl 78-78 Ogl	892 16 MP	78	4 in. 0-66	Opl	10.85	02-12-79	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.16 --- DCB3.	445634093205903	160030	W116	do	E. H. Renner	-04-79	0-67 Qd	909.59	67	0-4 in. 0-63	Qd	35.01	06-05-79	O
117.21.16 --- CDB3.	445617093211502	160031	W117	do	do	-04-79	0-72 Qd	917.73 MP	72	4 in. 0-68	Qd	39.68	06-05-79	O
117.21.20 --- CDC1.	445516093222501	216088	W118	Minneapolis Park Board-Meadowbrook Golf Course.	do	---	0-80 Qd 80-89 Opl 89-245 Osp 245-370 Opc 370-485 Cj 485-487 Cal	905	487	---	Opc-Cal	---	---	---
117.21.20 --- DAC1.	445527093215201	216009	W119	do	---	-06-35	0-74 Qd 74-82 Opl 82-90 Ogl 90-252 Osp 252-375 Opc 375-465 Cj 465-502 Cal	890	502	16 in. 0-77 12 in. 77-257	Opc-Cal	54.5	06-28-35	---
117.21.16 --- DCA2.	445014093212802	165516	W120	Monitoring well	E. H. Renner	-07-79	0-95.5 Qd 95.8-98 Opl, (weathered) 98-107 Opl 107-108.6 Ogl	919.8 MP	105.7	4 in. 0-98	Opl	38.84	07-12-79	G,O
117.21.21 --- BBD1.	445558093212001	165577	W121	do	do	-07-79	0-110 Qd 110-115 Opl, (weathered) 115-117 Ogl	918	113.25	4 in. 0-109	Opl	53.58	07-18-79	G,O
117.21.21 --- BAD1.	445557093210901	165578	W122	do	do	-08-79	0-120 Qd 120-212 Osp 212-239 Ospl	920	239	4 in. 0-217	---	---	---	G,O
117.21.21 --- BBC1.	445559093213201	216129	W140	Cambridge Brick	---	---	---	---	---	4 in	Opl?	---	---	D
117.21.17 --- DDD5	445607093214203	216051	W143	6425 Oxford St.	---	---	0-70 Qd 70-90 Opl	---	---	4 in. 0-70	Opl	---	---	G
28.24.06 --- BCD2	445634093204102	216128	W144	Interior Elevator	---	---	---	---	---	---	---	---	---	F

Table 1.—Data on selected wells and piezometers in the St. Louis Park area, Minnesota—Continued

702 POST OFFICE BUILDING
ST. PAUL, MINNESOTA 55101

PROVISIONAL RECORDS
Subject to Revision

Well number	Minnesota project well number	Site identification (latitude and longitude)	Owner name or other identifiers	Driller	Date drilled	Driller's log	Land surface elevation, in feet	Reported depth of well, in feet	Casing schedule	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117-21-16 C013	165590	445617093211001	Monitoring Well	E. H. Remmer	08-79	0-90 90-100 100-101	909.37 MP	103	4 in. 0-93	Op1	32.91 (below MP)	1-21-81	0,0
028-21-06 C013	165579	445617093212002	do	do	08-79	0-71 71-80 80-85 85-86	897.66 MP	84	4 in. 0-74	Op1	17.41 (below MP)	1-22-81	0,0
117-21-20 A011	227960	44556093212101	Cable-Steel Building	do	08-79	0-70 70-77	890.21 MP	70	4 in. 0-70	Op1	45.20 (below MP)	1-21-81	0
028-21-07 B011	165581	445561093212501	do	do	09-79	0-103 103-112 112-123	912.97 MP	123	4 in. 0-110.5	Op1	45.04 (below MP)	1-22-81	0,0
028-21-07 C013	165582	445562093213902	do	do	09-79	0-71 71-80 80-85 85-86	881.5 MP	90	4 in. 0-75	Op1	13.48 (below MP)	1-22-81	0
117-21-21 B013	165583	445563093212002	do	do	09-79	0-67 67-70	923.84 MP	67	4 in. 0-63	Op1	46.6 (below MP)	1-21-81	0
117-21-21 B011	165584	445564093212101	Monitoring Well	do	10-79	0-103 103-117 117-122	913.2	122	4 in. 0-117	Op1	45.20 (below MP)	1-21-81	0
117-21-20 A012	165585	445565093214901	do	do	09-79	0-80 80-85 85-86 86-88	891.6	86	4 in. 0-80	Op1	12.55 (below MP)	1-21-81	0
117-21-16 B011	165586	445614093218101	do	do	10-79	0-91 91-107 107-117	915.9	107	4 in. 0-97.5	Op1	35.42 (below MP)	1-21-81	0
117-21-21 B011	165587	44560093213701	do	do	10-79	0-78 78-84 84-93 93-101	901.8	93	4 in. 0-86	Op1	23.11 (below MP)	1-22-81	0
117-21-16 C012	165588	445617093212002	do	do	11-79	0-105 105-112 112-117	916.8	122	4 in. 0-116	Op1	51.13 (below MP)	1-21-81	0
117-21-16 C013	165589	445617093212003	do	do	11-79	0-73 73-80 80-85 85-86	916.63	73	4 in. 0-69	Op1	37.42 (below MP)	1-21-81	0
117-21-21 B012	165590	44557093210802	do	do	11-79	0-80 80-85 85-86 86-88	914.6	80	4 in. 0-76	Op1	43.20 (below MP)	1-22-81	0
117-21-16 B013	165591	445614093213103	do	do	11-79	0-53 53-60 60-65 65-66	915.8	53	4 in. 0-49	Op1	35.0 (below MP)	1-21-81	0
117-21-17 B013	165592	445615093210903	do	do	12-79	0-70 70-87 87-91	890.0	87	4 in. 0-73	Op1	7.63 (below MP)	1-22-81	0
117-21-19 A011	227957	445561093211501	Gun Club Well	do	12-79	0-122 122-137 137-142	900.15	137	4 in. 0-122	Op1	15.52 (below MP)	12-24-81	0
117-21-17 B011	227901	445611093213501	Monitoring Well	do	08-56	0-75 75-82 82-88 88-94	900.15	105	4 in. 0-79	Op1	24 (below MP)	8-28-56	0,AM
117-21-16 C013	227959	445615093211601	Murn. Rubber	do	1963	0-117 117-122 122-127 127-132	895	127	4 in. 0-117	Op1	39 (below MP)	3-57	P
028-21-06 B011	227961	44562093212001	Basin Lake Yards (Milwaukee R.R.)	E. H. Remmer	08-56	0-117 117-122 122-127 127-132	895	127	4 in. 0-117	Op1	39 (below MP)	3-57	P
118-21-29 B011	203892	44556093213901	Honeywell 1	Tri-State Drilling	3-57	0-117 117-122 122-127 127-132	895	127	4 in. 0-117	Op1	39 (below MP)	3-57	P

PROVISIONAL RECORDS
Subject to Revision

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
702 POST OFFICE BUILDING
ST. PAUL, MINNESOTA 55101

Township and range	Site identification Lat - Long	Minnesota unique well number	USGS project well number	Land surface altitude	M.P. altitude (as of Mar. 1982)	Well depth	Casing diameter (inch)	Casing depth (feet)	Geologic logs	Hydrologic unit Open to well bore (wells screened near water table are designated Wt)	Remarks
PROVISIONAL RECORDS Subject to Revision											
117N21W17CBD2	445625093223602	216110	P1	---	929.9	---	---	---	---	---	Destroyed Installed by Barr Engineering Co. Destroyed 1 1/2 inches x 2 feet x 10 slot screen Do
117N21W17DDA1	445616093214301	216111	P2	920.8	920.94	50	---	0-48	0-50 Qd	48-50 Qb	
117N21W17DCD1	445607093220401	216112	P3	892.2	892.50	---	---	---	---	---	
118N21W31BCC1	---	216113	P4	900.0	900	23	---	0-21	0-32 Qd	21-23 Wt	
117N21W07CBA1	445717093235601	216114	P5	930	932.7	47	1 1/2	0-45	0-47 Qd	45-47 Wt	
028N24W18DBB1	445442093202601	216115	P6	880	881.18	18	1 1/2	0-16	0-18 Qd	16-18 Wt	Do
117N21W17CDC2	445610093222601	216116	P7	890.5	889.59	---	---	---	---	---	Do
117N21W17DCA4	445614093220304	216117	P8	890.4	892.43	11	1 1/2	0-9	0-11 Qd	9-11 Wt	Do
117N21W17CDD3	445607093222103	216118	P9	891.4	893.85	13 1/2	1 1/2	0-11 1/2	0-15 Qd	11 1/2-13 1/2 Wt	Do
117N21W17DDA2	445616093214302	216119	P10	921.9	923.89	49 1/2	1 1/2	0-47 1/2	0-50 Qd	47 1/2-49 1/2 Wt	Do
117N21W17DDB1	445614093215303	216120	P11	896.0	897.80	14	1 1/2	0-12	0-16 Qd	12-14 Wt	Do
117N21W17DBB1	445628093220901	216121	P12	899.5	903.43	40	1 1/2	0-38	0-42 Qd	38-40 QM	Do
117N21W17BDD1	445633093221801	216122	P13	894.3	896.93	62	1 1/2	0-60	0-72 Qd	60-62 Qb	Permanently sealed
117N21W17DCA5	445614093220305	216123	P14	890.3	893.33	42	1 1/2	0-40	0-50 Qd	40-42 QM	Permanently sealed
117N21W17DCA6	445614093220306	216124	P15	890.3	893.06	67	1 1/2	0-65	0-67 Qd	65-67 Qb	1 1/2 inches x 2 feet x 10 slot screen
117N21W16DCB1	445634093205901	227902	P16	906.3	909.33	35	1 1/2	0-33	0-37 Qd	33-35 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W16DCB2	445634093205902	227903	P17	906.2	909.43	94 1/2	1 1/2	0-92 1/2	0-91 1/2 Qd	92 1/2-94 1/2 Qb	1 1/2 inches x 2 feet x 8 slot screen
117N21W16CDB4	445617093211503	227904	P18	915.1	915.73	42	1 1/2	0-40	0-42 Qd	40-42 QM	1 1/2 inches x 2 feet x 10 slot screen
117N21W20ABD2	445554093220302	227905	P19	889.0	890.73	7	1 1/2	0-5	0-7 Qd	3-5 Wt	Do
117N21W20ABD3	445554093220303	227906	P20	889.0	890.11	15	1 1/2	0-13	0-23 Qd	13-15 Wt	Do
PROVISIONAL RECORDS Subject to Revision											
117N21W17AAB2	445654093235502	227907	P21	923.75	923.75	42 1/2	1 1/2	0-40 1/2	0-42 1/2 Qd	40 1/2-42 1/2 Wt	Do
117N21W17ACD1	445637093215701	227908	P22	916.5	918.44	35	1 1/2	0-33	0-36 Qd	33-35 Wt	Do
117N21W17BAC1	445651093222903	227909	P23	896.7	898.71	14	1 1/2	0-12	0-15 Qd	12-14 Wt	Do
117N21W17CAA2	445630093222102	227910	P24	894.4	895.89	14 1/2	1 1/2	0-12 1/2	0-15 Qd	12 1/2-14 1/2 Wt	Do
117N21W17CAD3	445622093221902	227911	P25	890.4	892.21	7	1 1/2	0-5	0-15 Qd	5-7 Wt	Do
117N21W17DCB2	445615093220902	227912	P26	889.4	890.51	4 1/2	1 1/2	0-2 1/2	0-4 1/2 Qd	2 1/2-4 1/2 Wt	Do
117N21W18BDD1	445632093210001	227913	P27	886.8	889.12	17	1 1/2	0-15	0-17 Qd	15-17 Wt	Destroyed
117N21W18CBA1	445631093212001	227914	P28	909.5	911.30	32	1 1/2	0-30	0-42 Qd	30-32 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W18CAD1	445619093232701	227915	P29	906.6	907.31	15	1 1/2	0-13	0-15 Qd	13-15 Wt	Do
117N21W18DDB1	445618093230501	227916	P30	908.3	910.05	21	1 1/2	0-19	0-21 Qd	19-21 Wt	Do
117N21W18CDA1	445618093233101	227917	P31	909.8	911.59	21	1 1/2	0-19	0-27 Qd	19-21 Wt	Destroyed
117N21W18BDD1	445633093232801	227918	P32	919.5	921.34	28	1 1/2	0-26	0-32 Qd	26-28 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W18DBA1	445631093231101	227919	P33	908.2	909.32	22	1 1/2	0-20	0-22 Qd	20-22 Wt	1 1/2 inches x 2 feet x 40 slot screen
117N21W17BCD1	445634093223501	227920	P34	927.4	929.82	52	1 1/2	0-50	0-52 Qd	50-52 Wt	Do
117N21W17CBD1	445621093223201	227921	P35	923.9	927.54	47	1 1/2	0-45	0-52 Qd	45-47 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W16BBA1	445653093212001	227922	P36	915.3	918.76	47 1/2	1 1/2	0-45 1/2	0-47 1/2 Qd	45 1/2-47 1/2 Wt	Do
117N21W09CAC1	445711093211501	227923	P37	896.1	889.12	16 1/2	1 1/2	0-14 1/2	0-16 1/2 Qd	14 1/2-16 1/2 Wt	Do
117N21W08DAC1	445712093215601	227924	P38	922.2	924.63	48 1/2	1 1/2	0-46 1/2	0-49 Qd	46 1/2-48 1/2 Wt	Do
117N21W08CBD1	445714093223801	227925	P39	904.6	905.64	22	1 1/2	0-10	0-22 Qd	20-22 Wt	Do
117N21W07DDA1	445710083225901	227926	P40	908.7	909.98	15	1 1/2	0-13	0-15 Qd	13-15 Wt	Do
117N21W18ABC1	445648093231801	227927	P41	911.6	913.38	21	1 1/2	0-19	0-32 Qd	19-21 Wt	Do
117N21W20ACC1	445546093221301	227928	P42	898.3	899.94	21 1/2	1 1/2	0-19 1/2	0-22 Qd	19 1/2-21 1/2 Wt	Do
117N21W20DBB1	445539093221401	227929	P43	893.4	894.74	14 1/2	1 1/2	0-12 1/2	0-15 Qd	12 1/2-14 1/2 Wt	Do
117N21W20DAA1	445538093214301	227930	P44	895.9	897.04	15	1 1/2	0-13	0-16 Qd	13-15 Wt	Do
117N21W16DCA1	445614093212801	227931	P45	917.8	920.30	41 1/2	1 1/2	0-39 1/2	0-42 Qd	39 1/2-41 1/2 Wt	Destroyed 1 1/2 inches x 2 feet x 10 slot screen

PROVISIONAL RECORDS
Subject to Revision

TABLE 1 Continued

PROVISIONAL RECORDS
Subject to Revision

Township and range	Site identification Lat - Long	Minnesota unique well number	USGS project well number	Land surface altitude	M.P. altitude (as of Mar. 1982)	Well depth	Casing diameter (inch)	Casing depth (feet)	Hydrologic unit Geologic logs	Open to well bore (wells screened near water table are designated Wt)	Remarks
PROVISIONAL RECORDS Subject to Revision											
029N24W31D8B1	445716093202001	227932	P46	871.8	873.98	10 1/2	1 1/2	0-8 1/2	0-10 1/2 Qd	8 1/2-10 1/2 Wt	1 1/2 inches x 2 feet x 10 slot screen
028N24W06CAD1	445617093202601	227933	P47	884.6	886.57	21	1 1/2	0-19	0-22 Qd	19-21 Wt	Do
028N24W06BAB1	445651093203601	227934	P48	879.4	881.18	14	1 1/2	0-12	0-22 Qd	12-14 Wt	Do
028N24W07BDC1	445543093203101	227935	P49	907.7	910.17	45	1 1/2	0-43	0-45 Qd	43-45 Wt	Do
028N24W07CDB1	445523093203901	227936	P50	878.4	879.44	15	1 1/2	0-13	0-15 Qd	13-15 Wt	Do
117N21W21CDB1	445525093211701	227937	P51	899.8	901.54	18	1 1/2	0-16	0-18 Qd	16-18 Wt	Do
028N24W05CDA1	445615093191201	227938	P52	861	863	14	1 1/2	0-12	0-14 Qd	12-14 Wt	Do
029N24W32CCD1	445656093192901	227939	P53	870	872	31	1 1/2	0-29	0-32 Qd	29-31 Wt	Do
028N24W20ADD1	445358093193901	227940	P54	858	860	18	1 1/2	0-16	0-18 Qd	16-18 Wt	Do
029N24W31DAA1	445720093194701	227941	P55	868	871	23 1/2	1 1/2	0-21 1/2	0-28 Qd	21 1/2-23 1/2 Wt	Do
028N24W04AAD1	445642093172501	227942	P56	860	860	47	1 1/2	0-45	0-52 Qd	45-47 Wt	Do
028N24W16ABB1	445510093175301	227943	P57	---	---	12	1 1/2	0-10	0-17 1/2 Qd	10-12 Wt	Do
117N21W20ABD4	445559093220204	227944	P58	890.5	891.46	12	1 1/2	0-10	0-12 Qd	10-12 Wt	Do
117N21W17CAC3	445620093222602	227945	P59	892	893.96	10	1 1/2	0-8	0-12 Qd	8-10 Wt	Destroyed (removed)
029N24W31DAA1	445548093221501	227946	P60	892	894.38	10	1 1/2	0-8	0-10 Qd	8-10 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W16CCA1	445617093212001	227947	P61	917.1	921.42	47	1 1/2	0-45	0-47 Qd	45-47 Wt	Do
028N24W07BDB2	445551093203502	227948	P62	909.8	910.40	43	1 1/2	0-41	0-47 Qd	41-43 Wt	Do
117N21W16BCC2	445634093213102	227949	P63	915.9	916.71	46	1 1/2	0-44	0-47 Qd	44-46 Wt	Do
117N21W20AAD3	445555093214502	227950	P64	891.7	892.51	15	1 1/2	0-13	0-15 Qd	13-15 Wt	Do
117N21W21BBB2	445600093213702	227951	P65	901.7	904.11	28	1 1/2	0-26	0-28 Qd	26-28 Wt	Do
117N21W16CDA4	445617093211002	227952	P66	906.1	908.62	41 1/2	1 1/2	0-41 1/2	0-42 Qd	39 1/2-41 1/2 Wt	Do
117N21W21BCD2	445543093212102	227953	P67	913.2	914	21 1/2	1 1/2	0-19 1/2	0-22 Qd	19 1/2-21 1/2 Wt	Do
117N21W16BCC4	445634093213104	227954	P68	915.8	918.45	38	1 1/2	0-36	0-38 Qd	36-38 Wt	Do
117N21W17DBC2	445624093220802	227955	P69	907.1	908.51	24	1 1/2	0-22	0-26 Qd	22-24 Wt	Do
117N21W17CBD2	445621093223202	227956	P100	924.2	925.45	67	1 1/2	0-65	0-67 Qd	65-67 QM	Do
117N21W17CBD3	445621093223203	216200	P101	923.3	925.38	103	1 1/2	0-101	0-98 1/2 Qd	101-103 Op1	Do
117N21W16CCA4	445617093212004	216199	P102	917.1	919.57	107	1 1/2	0-105	98 1/2-103 Op1	105-107 Qb	Screen gravel packed
117N21W17BAC4	445651093223001	216198	P103	895.5	896.38	94	1 1/2	0-73	0-108 Qd	73-82 Op1	1 1/2 inches x 2 feet x 10 slot screen
									108-109 Og1		Screen gravel packed
									0-73 Qd		Open hole
									73-88 Op1		
									88-90 Og1		
									90-94 Osp		
117N21W17BAC5	445651093223002	216197	P104	895.1	895.84	33	1 1/2	0-31	0-34 Qd	31-33 QM	1 1/2 inches x 2 feet x 10 slot screen
117N21W17BAC6	445651093223003	216196	P105	895.4	896.28	61	1 1/2	0-59	0-61 Qd	59-61 Qb	Do
117N21W17BAC7	445651093222904	216195	P106	896.5	897.02	64 1/2	1 1/2	0-62 1/2	0-65 Qd	62 1/2-64 1/2 Qb	Do
117N21W20AAB2	445605093215102	216194	P109	892.5	892.69	44	1 1/2	0-42	0-44 Qd	42-44 QM	Do
117N21W20AAB3	445605093215102	216193	P110	892.5	892.56	12 1/2	1 1/2	0-10 1/2	0-12 1/2 Qd	10 1/2-12 1/2 Wt	Do
117N21W21BBB2	445600093213703	216165	P111	902.0	902.70	78	1 1/2	0-76	0-79 Qd	78-79 Op1	Do
117N21W21BBB3	445600093213704	216166	P112	902.2	903.47	50	1 1/2	0-48	79- Op1	48-50 QM	Do
117N21W21BAD3	445557093210903	216167	P113	915.3	916.88	210	1 1/2	0-201	0-114 Qd	201-207 Osp	1 1/2 inches x 6 feet x 10 slot screen
									207-210 Qd	214-212 Osp	3-foot casing below screen, gap on end
117N21W21BAD4	445557093210904	216168	P114	915.2	915.62	55	1 1/2	0-53	0-55 Qd	53-55 Wt	1 1/2 inches x 2 feet x 10 slot screen
028N24W06CAD3	445617093202603	216169	P116	885.1	885.08	91 1/2	1 1/2	0-89	0-69 Qd	69-79 Op1	1 1/2 inches x 2 feet x 10 slot screen
									79-80 Og1		Gravel pack to 10 feet below surface
									80 1/2-91 1/2 Osp		

PROVISIONAL RECORDS
Subject to Revision

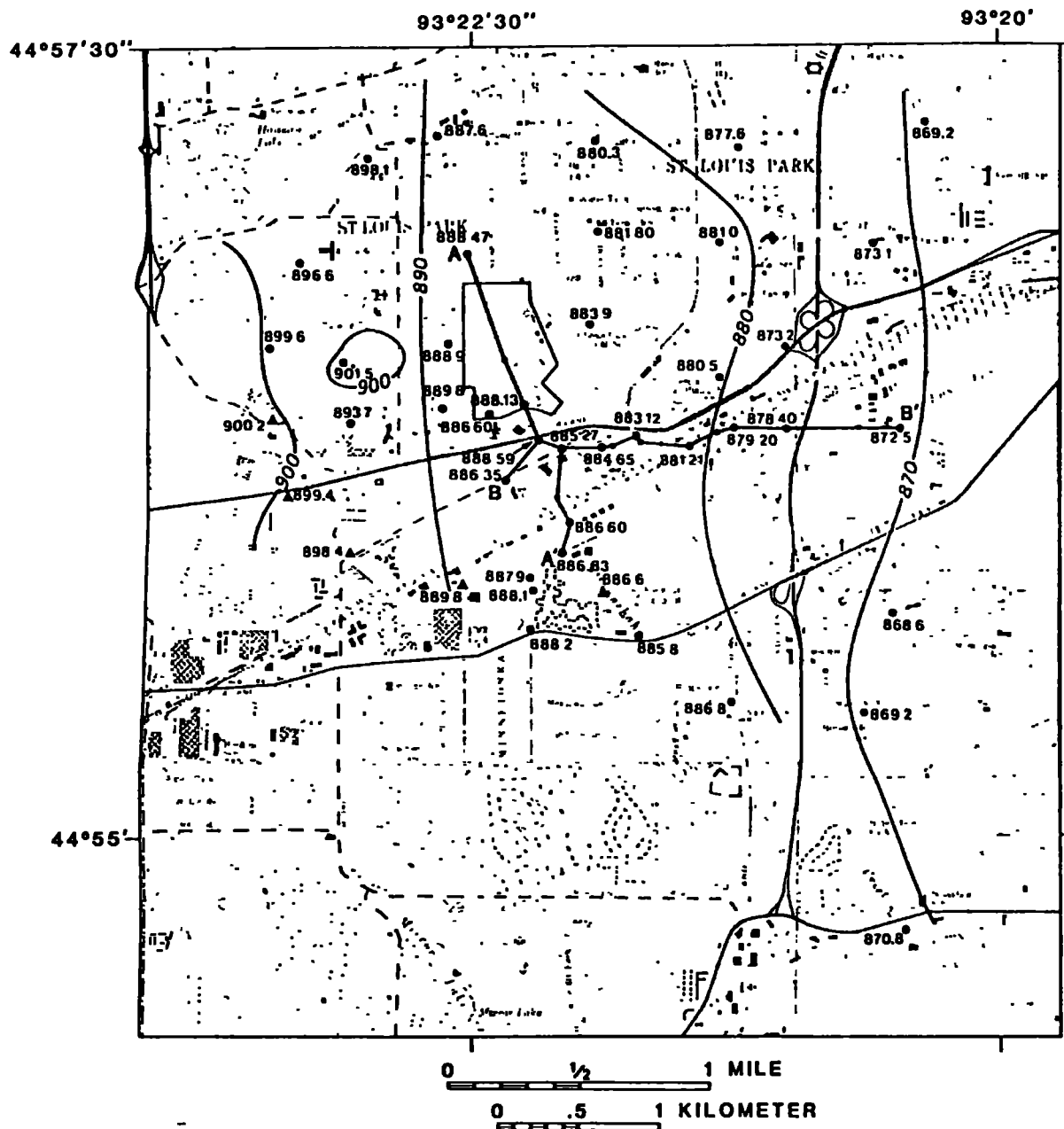
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TABLE 1 Continued

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
702 POST OFFICE BUILDING
ST. PAUL, MINNESOTA 55101

PROVISIONAL RECORDS
Subject to Revision

Township and range	Site identification Lat - Long	Minnesota unique well number	USGS pro- ject well number	Land surface altitude	M.P. alti- tude (as of Mar. 1982)	Well depth	Casing		Geologic logs	Hydrologic unit		Remarks
							diam- eter (inch)	depth (feet)		Open to well bore (wells screened near water table are designated Wt)		
PROVISIONAL RECORDS Subject to Revision												
28N24W6CAD4	445617093202604	216170	P117	885.2	887.41	33	1 1/2	0-70 1/2	0-33 Qd	21-31 QM		1 1/2 inches x 2 feet x 10 slot screen Gravel pack and grouted from above point to surface
117N21W17DDB4	445614093215304	216171	P118	896.0	896.96	72.5	1 1/2	0-70 1/2	0-65 Qd 65-85 Op1 85-87 1/2 Qgl	70 1/2-72 1/2 Op1		1 1/2 inches x 2 feet x 10 slot screen Gravel pack 8 1/2 to 65 feet. Grout from 65 feet to surface.
117N21W17DDB5	445614093215305	216172	P119	895.7	896.24	44.5	1 1/2	0-42 1/2	0-44 1/2 Qd	42 1/2-44 1/2 QM		1 1/2 inches x 2 feet x 10 slot screen Grouted above point to 10 feet be- low surface
117N21W17DDB6	445614093215306	216173	P120	896.0	896.34	62	1 1/2	0-60	0-62 Qd	60-62 QM		1 1/2 inches x 2 feet x 10 slot screen
117N21W17DCB4	445614093220601	216174	P121	889.5	889.89	82.5	1 1/2	0-67	0-64 1/2 Qd 64 1/2-82 Op1 82-84 1/2 Qgl	67-82 Op1		Open hole
117N21W17DCB5	445614093220602	216175	P122	890.6	891.28	35	1 1/2	0-33	0-36 Qd	33-35 QM		1 1/2 inches x 2 feet x 10 slot screen
117N21W17DCB6	445614093220603	216176	P123	889.4	891.01	24	1 1/2	0-22	0-24 Qd	22-24 QM		Do
117N21W17DCB7	445614093220604	216177	P124	889.4	891.83	58	1 1/2	0-56	0-61 Qd	56-58 QM		Do
117N21W17DCB4	445615093220904	227958	P134	---	---	68	1 1/2	0-66	0-68 Qd	Qb		1 1/2 inches x 2 feet x 10 slot screen (Point is not open - grout probably around openings)
1N21W17DDB5	445615093220905	216192	P125	---	---	57	1 1/4	0-74 1/2	0-77 Qd	77-79 QM		1 1/4 inches x 2 feet x 10 slot screen, Grouted 1/2 1 1/4 inches x 2 feet x 10 slot screen, Grouted 1/2
7N21W17DDB2	445615093220902	227966	P135	---	---	247	1 1/2	0-115	0-102 Qd 102-115 Op1 115-117 Qgl	225-228 Qp		1 1/2 inches x 2 feet x 10 slot screen, Grouted 1/2 1 1/2 inches x 2 feet x 10 slot screen, Grouted 1/2
PROVISIONAL RECORDS Subject to Revision												



EXPLANATION

Water-level altitude, in feet above sea level. Number of significant figures indicates reliability of measuring point altitude. (See text)

886.35 • Water-table piezometer and water-level altitude

898.4 Δ Surface-water station and water-level altitude

—880—

8' — 8'



WATER-TABLE CONTOUR-- Shows altitude of water table. Contour interval 10 feet. Datum is sea level

Line of section (plate 3).

Site of former plant

Figure 7 Generalized configuration of the water table, June 5, 1979

Cedar Lake Rd.

QOWB
Rec'd from MPCA 11-20-86
WMJ

Cedar
Lake

100

Figure 8 Water Level Information for the Middle Drift Aquifer
January 24, 1985 (MPCA)

Minnetonka Blvd

Texas Av.

Lake
Calhoun

23

Lake St.

Excelsior Blvd.

France Av.

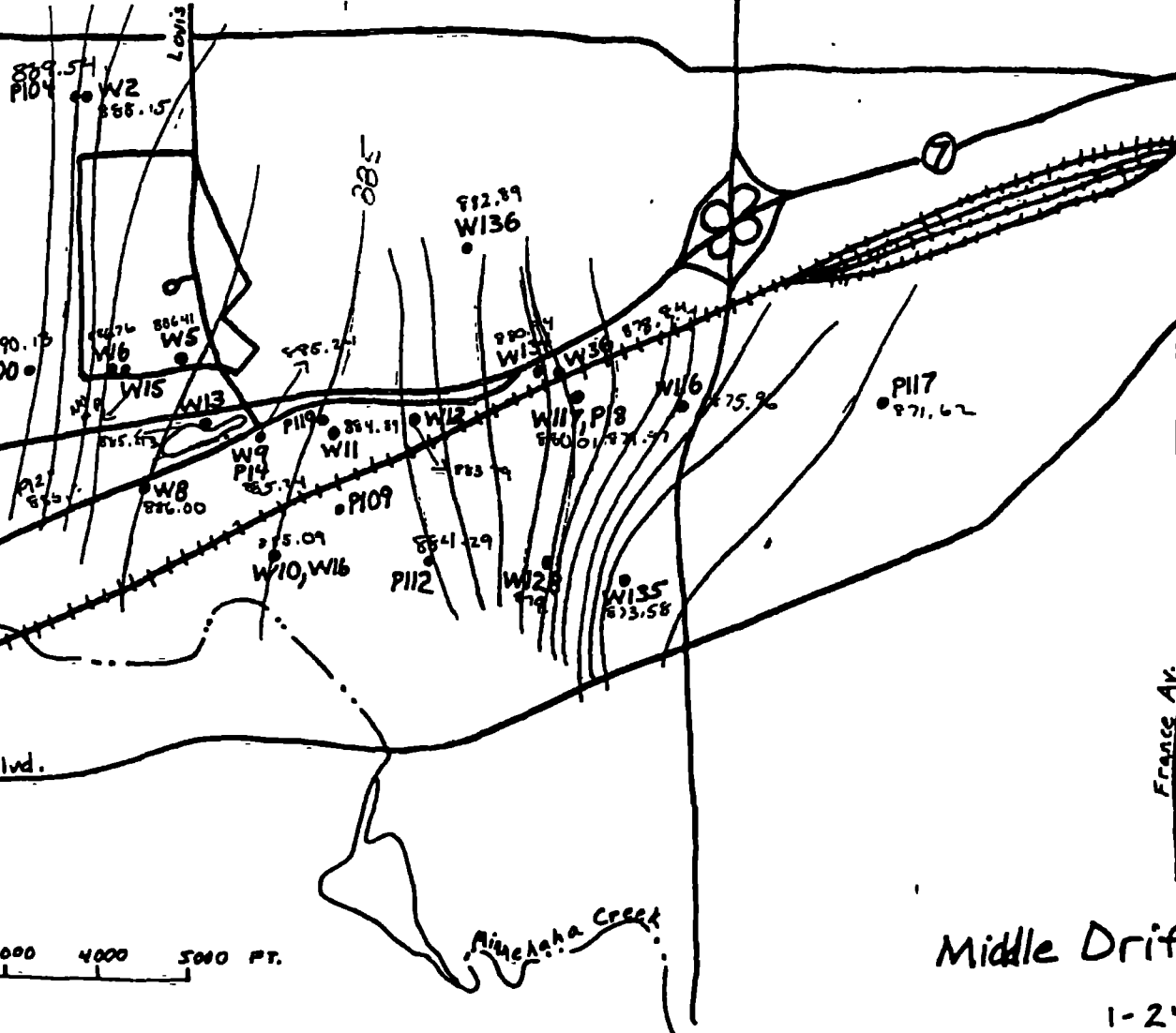
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0 1000 2000 3000 4000 5000 FT.

Minnetonka Creek

Middle Drift Aquifer

1-24-85

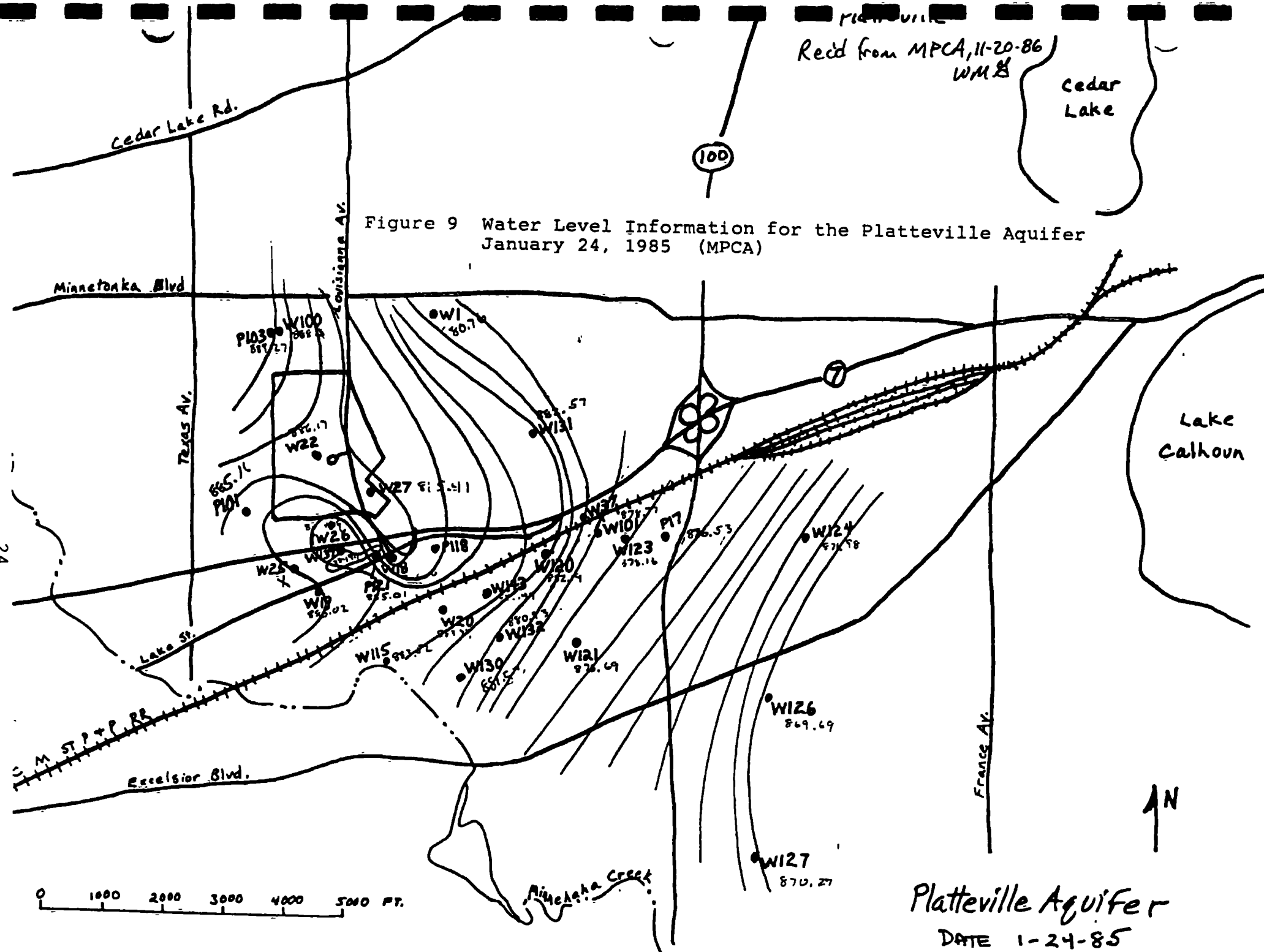


Richville
Rec'd from MPCA, 11-20-86
WM 8

Cedar Lake

100

Figure 9 Water Level Information for the Platteville Aquifer
January 24, 1985 (MPCA)



Platteville Aquifer
DATE 1-24-85

TABLE 2. MPCA DRIFT-PLATTEVILLE AQUIFER WATER LEVEL DATA

PLATTEVILLE AQUIFER					DRIFT AQUIFER				
DATE	LOCATION	WELL	WATERELE	AQUIFER	DATE	LOCATION	WELL	WATERELE	AQUIFER
1/24/85	1	W 127	870.27	OPVL	1/24/85	4	P 117	871.62	QOWB
1/24/85	3	W 126	869.69	OPVL	1/24/85	5	W 116	875.96	QOWB
1/24/85	4	W 124	871.98	OPVL	1/24/85	7	W 117	880.01	QOWB
1/24/85	5	P 17	876.53	OPVL	1/24/85	7	P 18	879.97	QOWB
1/24/85	6	W 123	878.16	OPVL	1/24/85	8	W 36	878.84	QOWB
1/24/85	7	W 101	878.77	OPVL	1/24/85	9	W 134	880.94	QOWB
1/24/85	8	W 37		OPVL	1/24/85	12	W 128	879	QOWB
1/24/85	10	W 120	882.19	OPVL	1/24/85	16	P 112	884.29	QOWB
1/24/85	12	W 121	876.69	OPVL	1/24/85	18	P 109		QOWB
1/24/85	14	W 130	881.53	OPVL	1/24/85	19	W 10	885.09	QOWB
1/24/85	15	W 115	883.52	OPVL	1/24/85	19	W 16		QOWB
1/24/85	16	W 132	880.93	OPVL	1/24/85	24	W 9	885.24	QOWB
1/24/85	17	W 143	883.47	OPVL	1/24/85	24	P 14	885.24	QOWB
1/24/85	18	W 20	883.79	OPVL	1/24/85	25	P 119		QOWB
1/24/85	24	W 18	886.16	OPVL	1/24/85	25	W 11	884.89	QOWB
1/24/85	25	P 118		OPVL	1/24/85	28	W 12	883.79	QOWB
1/24/85	30	W 137	884.94	OPVL	1/24/85	30	W 13	885.43	QOWB
1/24/85	32	W 19	886.02	OPVL	1/24/85	32	W 8	886	QOWB
1/24/85	41	W 100	888.34	OPVL	1/24/85	41	P 104	889.54	QOWB
1/24/85	42	W 1	880.76	OPVL	1/24/85	41	W 2	888.12	QOWB
1/24/85	45	W 131	882.57	OPVL	1/24/85	45	W 136	882.89	QOWB
1/24/85	47	W 27	885.41	OPVL	1/24/85	50	W 5	886.41	QOWB
1/24/85	49	W 22	886.17	OPVL	1/24/85	52	W 6	886.76	QOWB
1/24/85	51	W 26	884.46	OPVL	1/24/85	53	P 100	890.13	QOWB
1/24/85	53	P 101	885.16	OPVL					

strongly influenced as shown by anomalously low water levels in the bog area around wells W26 and W137. The Middle Drift water level contour map does not reflect the anomalous water levels, indicating a significant degree of hydraulic separation between the Drift and Platteville units in the bog area. In the Northern Area of the Drift-Platteville Aquifer there is a lack of data for the Middle Drift Aquifer (Figure 8); however, water level information for the Platteville Aquifer (Figure 9) provided by the MPCA indicates the Platteville Aquifer may have a northeastward component of ground-water flow. The 880-foot contour for the water table map (Figure 7) also suggests a northeastward flow direction in the Northern Area. Despite the overall lack of data, the Northern Area of the Drift-Platteville Aquifer generally lies down gradient from potential contaminant source areas at the former Reilly site. The Remedial Investigation will determine the existing ground-water flow pattern in the Northern Area of the Drift-Platteville Aquifer.

Tables 3 and 4 present the available PAH and phenolics data for the Drift-Platteville Aquifer. Representative PAH concentrations for Drift-Platteville Aquifer wells are shown in Figures 10, 11, 12, and 13. These figures illustrate that the highest PAH concentrations are generally found in Drift-Platteville Aquifer wells located in the bog area south of the site and east of the site and bog area. The bog area south of the site received contaminated surface runoff and process waters from the Reilly facility when it was in operation. Accumulation of contaminants has resulted in the occurrence of separate phase hydrocarbons at one location within the bog. Because the Northern Area did not receive contaminated surface runoff from the site, no separate phase hydrocarbons are expected in this area.

Many of the monitoring wells drilled in the Drift-Platteville Aquifer were drilled for the purpose of investigating contamination in the bog area and in areas downgradient from the bog (east and southeast). Few wells are available for monitoring the Northern Area of the Drift-Platteville Aquifer (directly east of the site). One Drift Aquifer well (W59) and one Platteville Aquifer well (W27) are located immediately east of Louisiana Avenue (W59 is actually located on the former Reilly site and has been permanently abandoned by the MDH) and they both have shown high concentrations of PAH and phenolics (Figures 10, 11, 12, 13 and Tables 3 and 4). One other pair of Drift and Platteville Aquifer wells is W131 and W136 located near the eastern boundary of the Northern Area. The water quality data for these wells show low levels of phenolics. The lack of data for the Northern Area has not enabled a decision to be made as to whether remedial actions are necessary to limit the further spread of contamination in the Drift-Platteville Aquifer. This Remedial Investigation will provide the data needed to complete the Feasibility Study so a decision about remedial actions can be made. Alternatives for remedial actions that will be considered in the Feasibility Study include ground-water containment options similar to the source and gradient control well systems that will be implemented

7-Jan-85

TABLE 3 RESULTS OF PAH AND PHENOLICS ANALYSES FOR
PLATTEVILLE WELLS^(a)

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC ^(b)	GC/MS	MBTH/4AAP	METHOD		
						UNKNOWN		
103	01-Jul-80 MAP	5.00 (5)	4.30 (4)	0.00	0.00 (0)		9611313	MDH
118	03-Jun-80 MAP	2,445.00 (2400)	0.00 (0)	0.00	92.00 (92)		9611412	MDH
P121	12-Jun-80 MAP	--	--		18.00 (18)			MDH
2900 CAVELLE ^(c)	15-Jan-80	1,526.70	187.50			0.00	9200675	MDH
2900 CAVELLE	Jul-83 MAP	100.00 (1500)	0.00 (190)		0.00 (0)			MRC
OR SWITCH HOUSE	07-Jul-81 MAP	16.60 (17)	3.70 (4)		0.00 (0)			MDH
SLP01 ^(c)	18-Sep-73					35.00	1000163	MDH
SLP01	25-Sep-73					0.00	50000353	MDH
SLP01	04-Dec-73					13.00	6600130	MDH
SLP01	03-Jan-74					0.00	1000149	MDH
SLP01	08-Jan-74					3.00	1000145	MDH
SLP01	16-Jan-74					0.00	1000143	MDH
SLP01	22-Jan-74					9.00	1000137	MDH
SLP01	30-Jan-74					0.00	1000135	MDH
SLP01	05-Feb-74					7.00	6400095	MDH
SLP01	25-Aug-75 MAP	--	--		(10)	0.00	544069	MDH
SLP03 (W113) ^(c)	18-Sep-73					0.00	1000163	MDH
SLP03 (W113)	04-Dec-73					2.00	6600130	MDH
SLP03 (W113)	03-Jan-74					5.00	1000149	MDH
SLP03 (W113)	08-Jan-74					6.00	1000145	MDH
SLP03 (W113)	16-Jan-74					0.00	1000143	MDH
SLP03 (W113)	22-Jan-74					4.00	1000137	MDH
SLP03 (W113)	30-Jan-74					0.00	1000135	MDH
SLP03 (W113)	05-Feb-74					0.00	6400095	MDH
SLP03 (W113)	17-Jul-74					0.00	6600075	MDH
SLP03 (W113)	25-Aug-75					16.00	544069	MDH
SLP03 (W113)	19-Oct-77					0.00	6002166	MDH
SLP03 (W113)	29-Jan-80	36.00	30.00				6610310	MDH
SLP03 (W113)	21-May-80	20.00	0.00				6640144	MDH
SLP03 (W113)	03-Jul-80	0.94	0.00					MDH
SLP03 (W113)	28-Jan-81	0.00	0.00				6646363	MDH
SLP03 (W113)	19-Jan-83 MAP	0.00 (10)	0.00 (6)			(13)	9611786	MDH

TABLE 3 RESULTS OF PAH AND PHENOLICS ANALYSES FOR
PLATTEVILL WELLS

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (RPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC	GC/MS	MBTH/4AAP	METHOD UNKNOWN		
W1	12-Apr-76				0.00		404579	BARR
W1	26-May-77				0.00		404579	BARR
W1	26-May-77				0.00		404579	BARR (MDH)
W1	29-Mar-79	70.00	0.00		0.00		9402559	MDH
W1	01-Jul-80	13.50	5.80	0.00	0.00		9611313	MDH
W1	06-Feb-81	450.00	0.00	0.00			800000	MRI
	MAP	(100)	(6)		(0)			
W18	29-Mar-79	47,620.00	0.00		73.00		9402553	MDH
W18	10-Jun-80 (23 MIN)				100.00			MDH
W18	10-Jun-80 (45 SEC)	5,127.00	0.00	0				MDH
W18	10-Jun-80 (30 SEC)	536.00	0.00	0.00	110.00		9611348	MDH
W18	18-Jan-84			74.00	150.00		9629558	MDH
	MAP	(5000)	(0)		(100)			
W19	Mar-79	12.50	6.00			10.00	WSP2211	HULT 1981
W19	21-Mar-79	9.90	5.30		10.00		9402757	MDH
W19	23-Jul-80	1.40	0.00		0.00		9611350	MDH
	MAP	10	6		10			
W20	Mar-79	36.80	4.00			40.00	WSP2211	HULT 1981
W20	21-Mar-79	36.00	4.18		34.00		9402757	MDH
W20	26-Jul-80				36.00		9611352	MDH
	MAP	36	4		36			
W22	29-Mar-79	890.00	0.00		0.00		9402553	MDH
W22	25-Jul-80	75.50	10.10		0.00		9611284	MDH
	MAP	(900)	(10)		(0)			
W26	17-Apr-79	12,220.00	40.00		2.20		9402664	MDH
W26	26-Jul-80				22.00		9611356	MDH
	MAP	(12000)	(40)		(22)			
W27	17-Jul-79	7,995.00	0.00		52.00		9402761	MDH
W27	25-Jul-80	2,362.00	20.00		180.00		9611358	MDH
W27	Jul-83	6,000,000.00	0.00		26,000.00			MRC
W27	10-Oct-83	1,230,000.00	0.00					MRC
	MAP	1000000	0		2600			
W30 (c)	03-Jan-70					0.00	9611878	MDH
W30	03-Jan-74					0.00	640080	MDH
W30	08-Jan-74					4.00	9611878	MDH
W30	16-Jan-74					0.00	50000342	MDH
W30	05-Feb-74					2.00	9611878	MDH

TABLE 3 RESULTS OF PAH AND PHENOLICS ANALYSES FOR PLATTEVILL WELLS

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC	GC/MS	MBTH/4AAP	METHOD UNKNOWN		
W30	26-Apr-79	70.00	1.30			0.00	9200714	MDH
W30	14-May-79	189.40	10.30			5.80	9200726	MDH
W30	26-Apr-80	70.00	1.30			5.80	9611881	MDH
	MAP	(100)	(8)			(4)		
W33 (c)	18-Dec-73				1,000.00		9611886	MDH
W33	27-Dec-73				1,200.00		9611886	MDH
W33	03-Jan-74				1,200.00		9611886	MDH
W33	08-Jan-74				1,000.00		9611886	MDH
W33	16-Jan-74				1,100.00		9611886	MDH
W33	22-Jan-74				1,200.00		9611886	MDH
W33	30-Jan-74				1,100.00		9611886	MDH
W33	05-Feb-74				1,100.00		9611886	MDH
W33	22-May-74				620.00		9611886	MDH
W33	11-Nov-74				1,100.00		9611886	MDH
W33	01-Apr-76				170.00		404579	BARR
W33	26-May-77				140.00		404579	BARR
W33	26-May-77				390.00		404579	BARR
W33	10-Jul-78					22.00	7366666	MDH
W33	05-Jun-79	4.10	9.10		220.00		9200709	MDH
	MAP	(4)	(9)		(1400)			
W37	Jan-79	902.50	0.00		10.00		WSP2211	MULTI-USE
W37	08-Feb-79	862.20	0.00		11.00		7200360	MDH
	MAP	900	0		10			
W38 (c)	09-Jan-80	42,460.00	10,650.00			11.60	9200730	MDH
W38	07-Apr-80 (11110)	6,040.00	478.00		2.80		9201261	MDH
W38	07-Apr-80 (1505)	28,600.00	2,463.00		2.20		9201261	MDH
W38	07-Apr-80 (1237)	116,100.00	15,150.00				9201260	MDH
	MAP	(100000)	(10000)		(10)			
W60 (c)	13-Jun-79	20.50	28.70			4.80	9200730	MDH
	MAP	(21)	(29)			(5)		
W75 (c)	22-May-79	80.80	2.40			0.00	9200705/7200245	MDH
	MAP	(81)	(2)			(0)		
W100	Jan-79	61.80	1.00			0.00	WSP2211	MULTI-USE
W100	21-Mar-79	65.00	1.65			0.00	9402754	MDH
W100	29-Mar-79				0.00		9402585	MDH
W100	30-Jun-80	6.70	0.00		7.00		9611316	MDH
W100	15-Jul-80	1.00	3.90				9611382	MDH
W100	08-Dec-80	6,050.00	100.20				9611588	MDH
W100	09-Sep-82	0.00	0.00				534013	CHEMICAL

TABLE 3 RESULTS OF PAH AND PHENOLICS ANALYSES FOR PLATTEVILLE WELLS

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC	GC/MS	MBTH/4AAP	METHOD UNKNOWN		
W100	08-Nov-82 MAP	19.20 60	2.50 (4)		(7)		534013	CH2M HILL
W101	Jan-79	1,041.00	1.00			20.00	WSP2211	HULT 1981
W101	21-Mar-79	848.30	0.90		14.00		9402504	MDH
W101	17-Apr-79				14.00		9402667	MDH
W101	23-May-80	986.00	200.00		27.00		9611386	MDH
W101	16-Jul-80	1,801.00	0.00					MDH
W101	06-Feb-81	5,540.00	0.00	0.00			800000	MRI
W101	Jul-83	80,000.00	0.00		6,000.00			MRC
W101	06-Sep-83				26.00		9611021	MPCA
W101	10-Oct-83 MAP	20,000.00 10000	0.00 0		26			MRC
W115	Jan-79	161.00	0.00			10.00	WSP2211	HULT 1981
W115	21-Mar-79	138.00	0.00			9.00	9402754	MDH
W115	17-Apr-79				9.00		9402667	MDH
W115	23-Jul-80 MAP	141.20 (150)	5.00 (5)		6.60 10		9611328	MDH
W120	29-May-80 MAP	119.00 (120)	0.00 (0)		41.00 (41)		9611300, 9611298	MDH
W121	26-Jun-80 MAP	1.10 (1)	0.00 (0)		3.20 (3)			MDH
W123	23-May-80	8,795.00	0.00		14.00		9611425	MDH
W123	07-Sep-83 MAP				32.00 30		9611020	MPCA
W124	22-May-80	21,030.00	813.00		5.00		9611429	MDH
W124	16-Jul-80	4.69	0.00					MDH
W124	06-Feb-81	0.00	0.00	0.00			800000	MRI
W124	06-Feb-81	485.00	51.00				800000	MRI
W124	06-Sep-83				0.00		9611022	MPCA
W124	10-Oct-83 MAP	0.00 500	0.00 51		(2)			MRC
W126	24-Jun-80	9.60	1.60	0.00	5.80		9611433	MDH
W126	10-Oct-83 MAP	300.00 300	0.00 0		(6)			MRC
W127	23-Jun-80 MAP	0.00 (0)	0.00 (0)	0.00	13.00 (10)		9611435	MDH

TABLE 3. RESULTS OF PAH AND PHENOLICS ANALYSES FOR
PLATTEVILL WELLS

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC	GC/MS	MBTH/4AAP	METHOD UNKNOWN		
W130	01-Jul-80 MAP	89.90 (90)	0.00 (0)	0.00	5.60 (3)		9611313	MDH
W131	15-Dec-83 MAP	--	--	28.00	37.00 (30)		9828657	MDH
W132	27-Jun-80 MAP	74.00 (74)	0.00 (0)	0.00	12.00 (6)		9611449	MDH
W137	12-Jun-80 MAP	4,411.00 (4400)	189.00 (190)		2.70 (3)			MDH
W143	25-Jul-80	58.10	7.00		2.60		9611447	MDH
W143	10-Oct-83 MAP	300.00 300	0.00 (7)		(3)			MRC

TABLE 3 (Cont'd)

- a. All results reported as below detection limits are counted as zero. The detection limits varied considerably for PAH (tenths of a part per trillion to tenths of parts per million), but were generally 2 parts per billion for most phenolics analyses (MDH lab MBTH method).
- b. Carcinogenic PAH include benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, dibenzo(a,e)pyrene, dibenzo(a,h)pyrene, dibenzo(a,i)pyrene, 7,12-dimethylbenz(a)anthracene, indeno(1,2,3-cd)pyrene, and 3-methylcholanthrene.
- c. These wells are multi-aquifer wells that probably yielded some unknown fraction of their total discharge from the Platteville aquifer.
- d. Evidently, time series sampling was done, however the starting time for pumping is not indicated on the data sheets.

TABLE 4

RESULTS OF PAH AND PHENOLICS ANALYSES FOR
DRIFT WELLS^(a)

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
P8	05-Jun-80 Map	1,602 (1600)	123 (120)	0	10	(10)	9611321	MDH
P11	02-Jun-80 Map	1,540 (1500)	1,258 (1300)	0	9.5	(10)	9611331	MDH
P14	05-Jun-80	126,730	0	572	8,000		9611341	MDH
P14	Feb-81	10,7000,000 ^(c)				10,700	515700	EHRlich 1982
P14	11-Mar-81	320,000	0	0			800016	MRI
P14	10-Jun-81	300,000	850				6641413	USGS
P14	12-Jan-84			2,000	3,600		9629556	MPCA
P14	17-Jan-84 MAP	300,000	300	2,200	3,500	2,000	9629557	MPCA
P15	04-Jun-80 MAP	654 (650)	71 (70)	360	130	(200)		MDH
P47	28-May-80 MAP	0 (0)	0 (0)	0	2	(2)	9611203	MDH
P50	23-Jun-80 MAP	70 (70)	0 (0)		13	(13)	9611373	MDH
P59	28-Jul-80 MAP	363,580 (360,000)	13,890 (14,000)		6,300	(6,300)	9611376	MDH
P65	26-Jun-80 MAP	71.2 (70)	0 (0)	0	4	(4)	9611380	MDH
P102	30-May-80 MAP	1,353 (1400)	53 (50)	0	8	(8)	9611387	MDH

TABLE 4 (Cont'd)

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
P106	30-Jun-80 MAP	128.5 (130)	13 (13)	0	3.4	(3)	9611316	MDH
P109	26-Jul-80 MAP	-	-		20	(20)	9611286	MDH
P110	02-Jul-80 MAP	773.7 (770)	8.4 (8)	0	0	(0)	9611397	MDH
P111	26-Jun-80 MAP	95.2 (95)	41.8 (40)	0	4.5	(5)	9611401	MDH
P112	27-Jun-80 MAP	79.2 (80)	10.8 (10)	0	9	(10)	9611401	MDH
P117	28-May-80	0	0	0	2.6		9611203	MDH
	01-Sep-83				9.4		9611022	MPCA
	16-Jul-80 MAP	17.4 (17)	12.5 (12)			(6)		MDH
P119	03-Jun-80	2,565	0	0	200		9611413	MDH
	01-Feb-81	2,400,000 (c)		0			515700	EHRLICH 1982
	MAP	1,000,000	0			(200)		
P120	03-Jun-80 MAP	247,822 (250,000)	52 (52)	0	360	(360)	9611415	MDH
P122	12-Jun-80 MAP	4,411 (4,400)	189 (190)	0	7,500	(7,500)		MDH
P123	10-Jun-80 MAP	69,300 (70,000)	14,870 (15,000)	524	7,300	(7,300)	9611426	MDH

TABLE 4 (cont'd)

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
P124	10-Jun-80	42,520	0	499	3,000		9611430	MDH
	MAP	(43,000)	(0)			(3,000)		
BURN DUMP	23-Dec-83	0	0					MRC
	MAP	0	0			-		
HABCO ^(d)	27-Jun-75					340	7600462	MDH
	MAP	-	-			(340)		
SKIPPY	23-Dec-83	0	0					MRC
	MAP	0	0			-		
W2	12-Apr-76				0		404579	BARR
	25-May-77					0	6100228	MDH
	26-May-77				0		404579	BARR
	29-Mar-79	0	0		5		9402583	MDH
	30-Jun-80	8	12	0	4.4		9611316	MDH
	01-Jun-80					5	515700	EHRlich 1982
	15-Jul-80	73.1	2.5				9611278	MDH
	12-Dec-80	52.1	372.1					MDH
	06-Feb-81	690	0	0			80000	MRI
	09-Sep-82	32	0				534015	CH2M HILL
	07-Nov-82	18	0				534015	CH2M HILL
	MAP	(50)	(10)			(5)		
W3	26-May-77				0		404589	BARR
	MAP					0		
W5	08-Apr-76				153		404579	BARR
	25-May-77					35	6100228	MDH
	26-May-77				22		404579	BARR
	02-Jun-77				28		404579	BARR
	29-Mar-79				9.4		9402559	MDH
	MAP	-	-			(30)		

TABLE 4 (Cont'd)

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
W6	08-Apr-76				43		404579	BARR
	25-May-77					190	6100228	MDH
	26-May-77				88			BARR
	02-Jun-77				50		404579	BARR
	01-Mar-79	12,400,000	1,000,000			100	WSP2211	HULT 1981
	03-Apr-79	1,000,000	1,000,000		93		9402618	MDH
	28-Jul-80				22		9611320	MDH
	MAP	1,000,000	1,000,000			100		
W7	06-Apr-76				0		404579	BARR
	17-Jan-84			170	340		9629557	MPCA
	MAP	-	-			200		
W8	12-Apr-76				0		404579	BARR
	25-May-77					0	6100228	MDH
	26-May-77				0		404579	BARR
	10-Apr-79	5,630	0		9		9402639	MDH
	22-Jul-80	28	14		3.4		9611280	MDH
	MAP	(100)	(14)			9		
W9	01-Apr-76				3,000		404579	BARR
	25-May-77					1,100	6100228	MDH
	26-May-77				600			BARR
	31-May-77	0	0				404788	USEPA (BARR)
	02-Jun-77				600		404579	BARR
	18-Feb-77				760		404579	BARR
	28-Mar-79				110		9402551	MDH
	05-Jun-80(10 MIN)	20,846	0	0	290		9611323	MDH
	05-Jun-80	6,799	600	0	86		9611323	MDH
	19-Jan-84			350	840		9629559	MPCA
	MAP	(10,000)	(200)			(800)		

TABLE 4 (Cont'd)

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
W10	01-Apr-76				0		404579	BARR
	25-May-77					17,000	6100229	MDH
	26-May-77				4		404579	BARR
	01-Mar-79	3,100	0			6	WSP2211	HULT 1981
	05-Apr-79	2,458	0		4.8		9402625	MDH
	23-Jul-80	292	30.4		15.7			MDH
	23-Dec-83	0	0					MRC
	MAP	3,000	(10)			5		
W11	09-Dec-76				22		404579	BARR
	25-May-77					23	6100229	MDH
	26-May-77				4		404579	BARR
	01-Mar-79	4,000	100			4	WSP2211	HULT 1981
	03-Apr-79	4,650	206		3.8		9402618	MDH
	02-Jun-80	1,290	82	0	9		9611336	MDH
	15-Dec-83			2.6	16		9628657	MPCA
	MAP	4,000	200			10		
W12	10-Dec-76				14		404579	BARR
	10-Apr-79	908,260	110		26		9402639	MDH
	04-Jun-80	6,375	64	0	36		9611282	MDH
	25-Jun-80	2.3	0	0	3.8			MDH
	01-Jul-80					400	515700	EHRLICH 1982
	10-Oct-83	60,000	0					MRC
	MAP	10,000	(20)			100		
W15	25-May-77					37	6100229	MDH
	26-May-77				28		404579	BARR
	23-Jul-80	111.2	5		6.6			MDH
	28-Jul-80	1,337	184		14			MDH
	MAP	(1,000)	(100)			(20)		

TABLE 4 (Cont'd)

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic (b)	GC/MS	MBTH/4 AAP	Method Unknown		
W16	19-Apr-77				2		404579	BARR
	25-May-77					0	6100229	MDH
	26-May-77				4		404579	BARR
	01-Mar-79	100	0			0	WSP2211	HULT 1981
	05-Apr-79	210	0		0		9402625	MDH
	23-Jul-80	13.6	0		2.7		9611327	MDH
	23-Dec-83	0	0					MRC
	MAP	100	0			(4)		
W17	19-Apr-77				280		404579	BARR
	25-May-77					340	6100230	MDH
	26-May-77				140		404579	BARR
	31-May-77	1,700,000 (c)	0					USEPA
	02-Jun-77				180		404579	BARR
	22-Jun-77				32		404579	BARR
	01-Mar-79	5,000	0			200	WSP2211	HULT 1981
	03-Apr-79	14,510	0		240		9402618	MDH
	02-Jun-80	3,733	0	0	300		9611345	MDH
	16-Jan-84			180	300		9628658	MPCA
	MAP	100,000	0			250		
W25	25-May-77				35		6100228	MDH
	MAP	-	-			(35)		
W59	15-Feb-80	47,000	12,600		31		9201273	MDH
	MAP	(47,000)	(13,000)			(31)		
W65(e)	08-Feb-79	28,192	331.7		3.8		7200360	MDH
	09-Feb-79	2,725.2	422.8					MDH
	01-Jul-83	500	0			0		MRC
	10-Oct-83	400	0					MRC
	MAP	3,000	(350)			(2)		

TABLE 4 (Cont'd)

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
W116	17-Apr-79	11,900	0		2.6		4402658	MDH
	23-May-80	803	313		5		9611407	MDH
	01-Feb-81	0	0	0			800013	MRI
	06-Sep-83				20		9611021	MPCA
	MAP	(1,000)	(80)			(5)		
W117	01-Jan-79	4,900	0				6641413	USGS
	10-Apr-79	908,170	110		26		9402639	MDH
	17-Apr-79	61,800	0		20		4402658	MDH
	23-May-80	760	0		15		9611409	MDH
	01-Jul-80	0	0			10	515700	EHRlich 1982
	16-Jul-80	3.4	10					MDH
	11-Mar-81	13,410	48.1		11		6640329	MDH
	11-Feb-81	3,000	0	0			800000	MRI
	06-Sep-83				30		9611021	MPCA
	01-Oct-83	30,000	0					MRC
	10-Oct-83	40,000	0					MRC
	02-Dec-83			9.8	41		9628655	MPCA
	MAP	40,000	(10)			30		
W128	25-May-77				56,000		6100229	MDH
	MAP	-	-			(56,000)		
W134	01-Dec-83			28	30		9628654	MPCA
	MAP	-	-			30		
W135	25-Jun-80	5.3	0	0	4.8		9611444	MDH
	MAP	(5)	(0)			(5)		
W136	07-Dec-83			21	11		9628656	MPCA
	MAP	-	-			15		

TABLE 4 (Cont'd)

- a. All results reported as below detection limits are counted as zero. The detection limits varied considerably for PAH (tenths of a part per trillion to tenths of parts per million), but were generally 2 parts per billion for most phenolics analyses (MDH lab MBTH method).
- b. Carcinogenic PAH include benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, dibenzo(a,e)pyrene, dibenzo(a,h)pyrene, dibenzo(a,i)pyrene, 7,12-dimethylbenz(a)anthracene, indeno(1,2,3-cd)pyrene, and 3-methylcholanthrene.
- c. Individual PAH were not identified, only a total PAH reported with no indication of carcinogenic fraction.
- d. Sample was collected from the water table at a depth of four feet. there was no indication on the data sheet that the sample came from a well.
- e. W65 is a Platteville-St. Peter well according to Hult, 1981. However in 1983 this well was only 57 feet deep, so it is assumed to now draw water from holes in the casing adjacent to the drift.

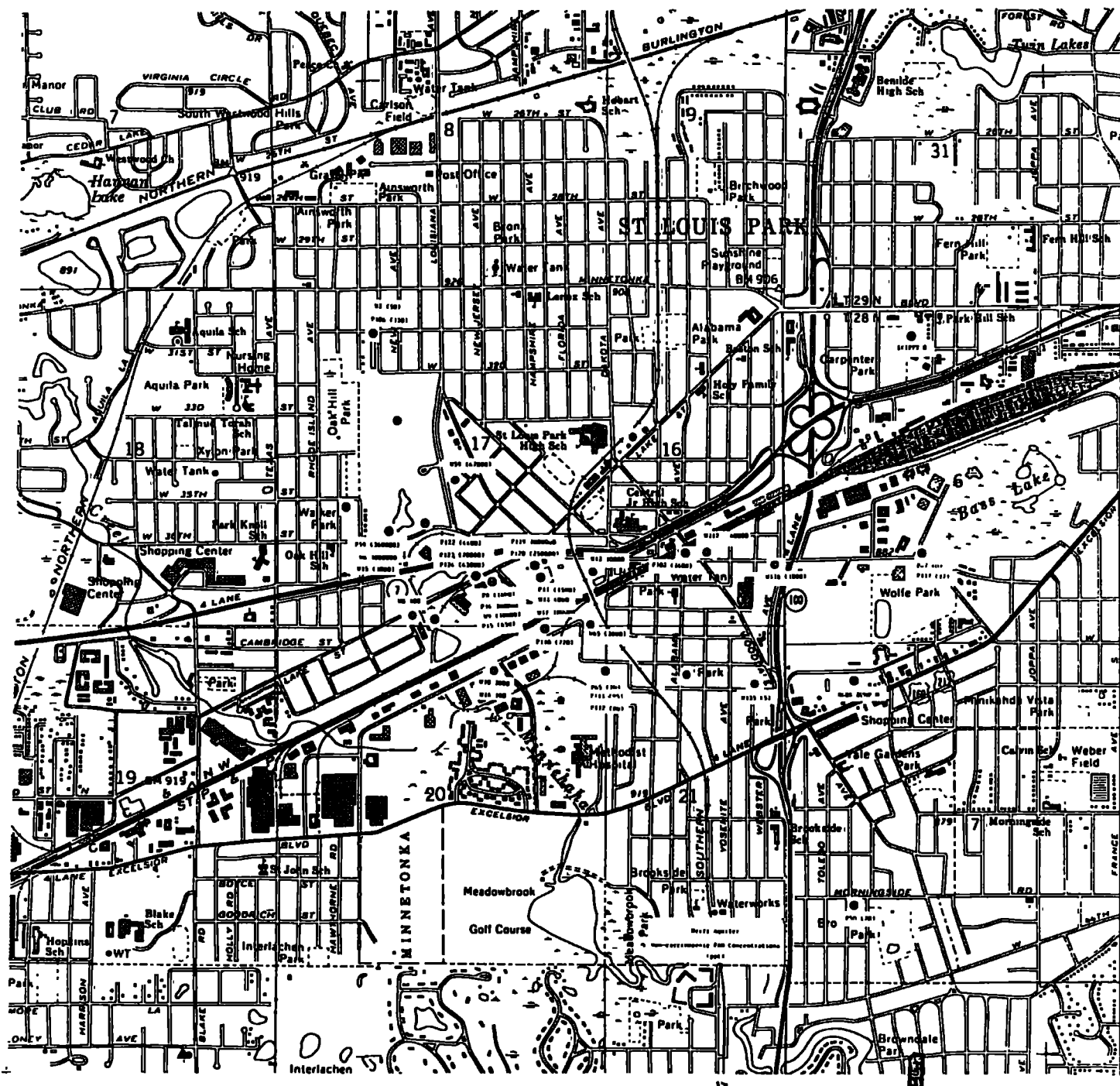


Figure 10 Drift Aquifer Non-carcinogenic PAH Concentrations (ppt)

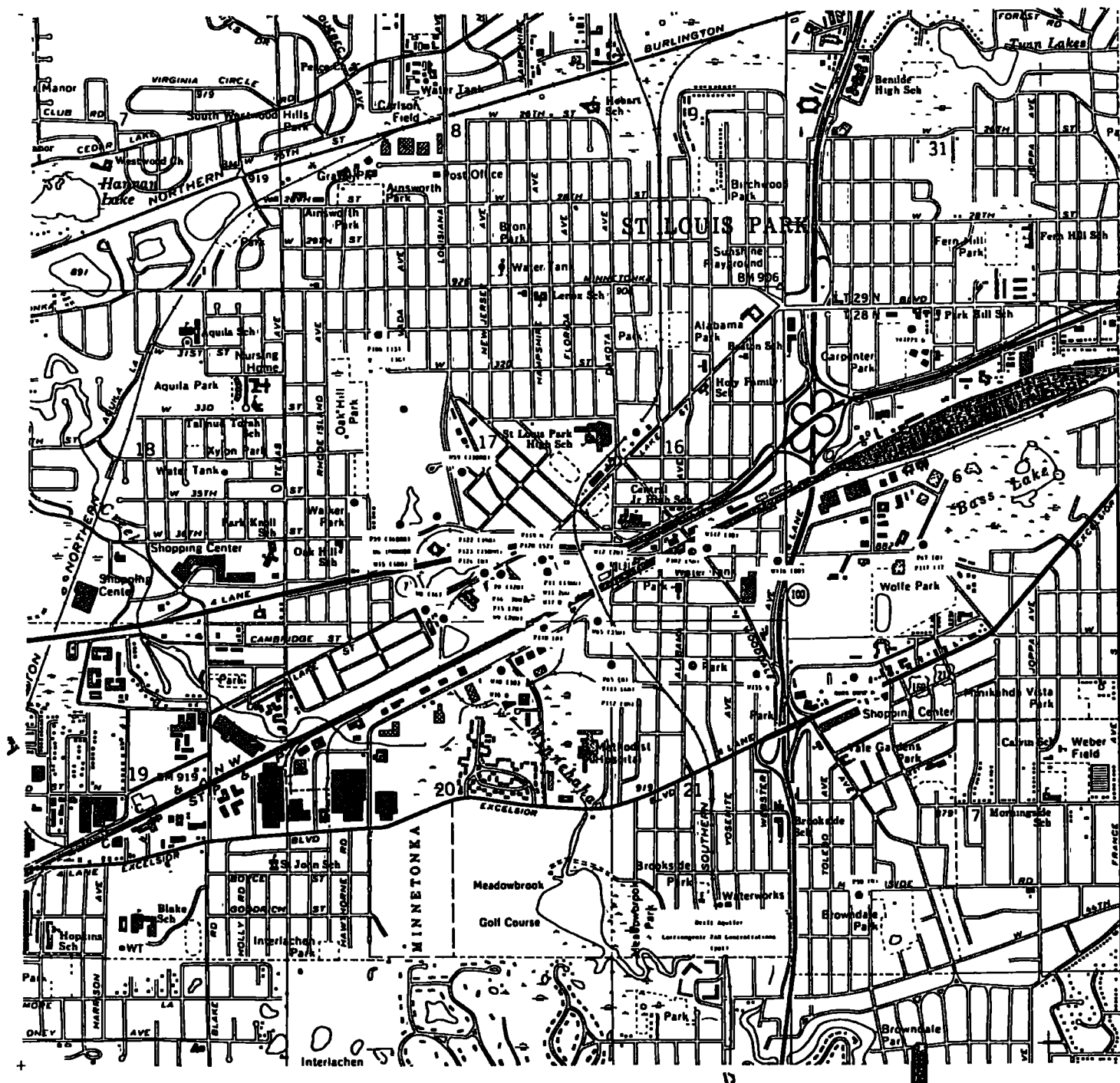


Figure 11 Drift Aquifer Carcinogenic PAH Concentrations (ppt)

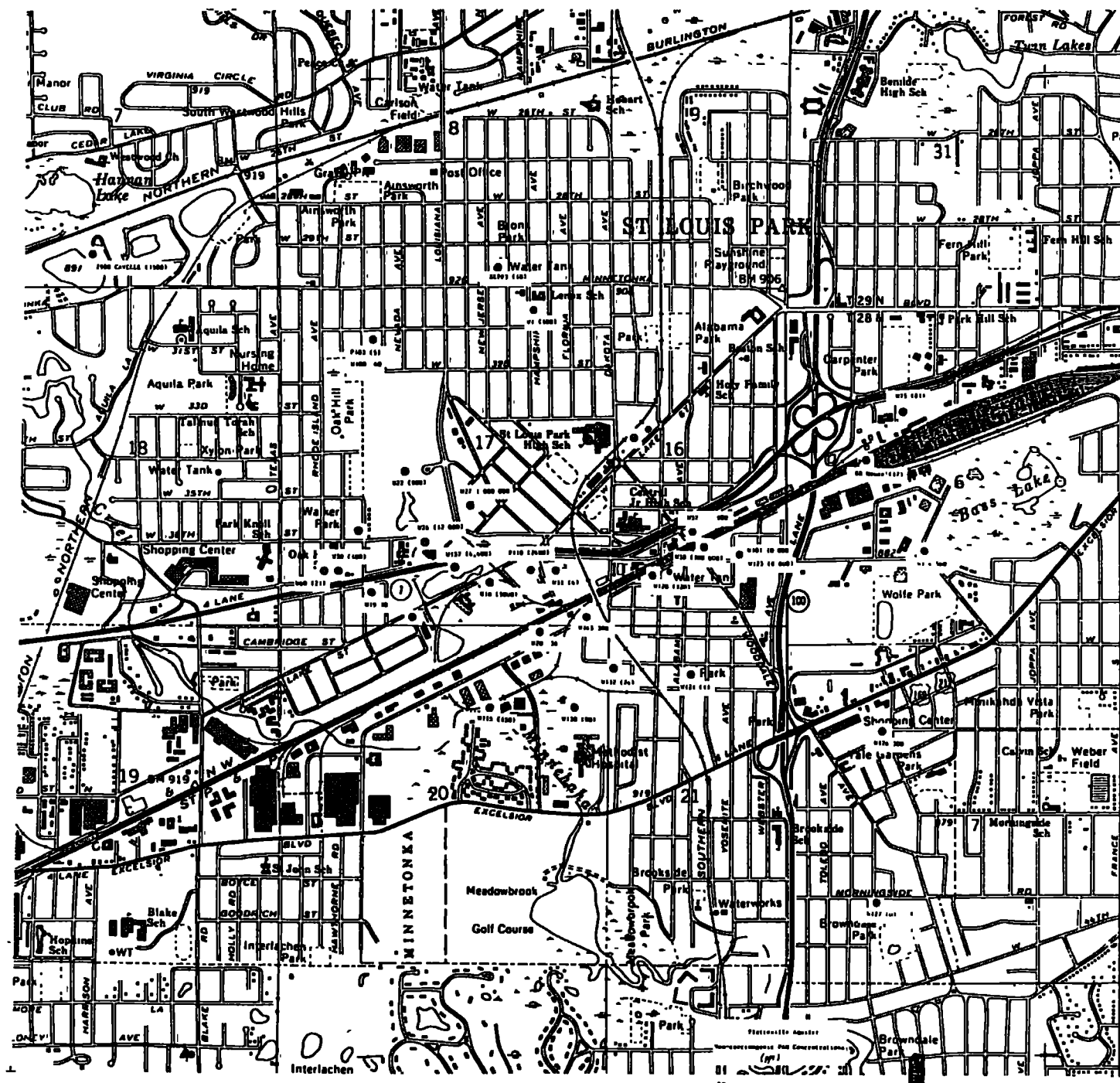


Figure 12 Platteville Aquifer Non-carcinogenic PAH Concentrations (ppt)

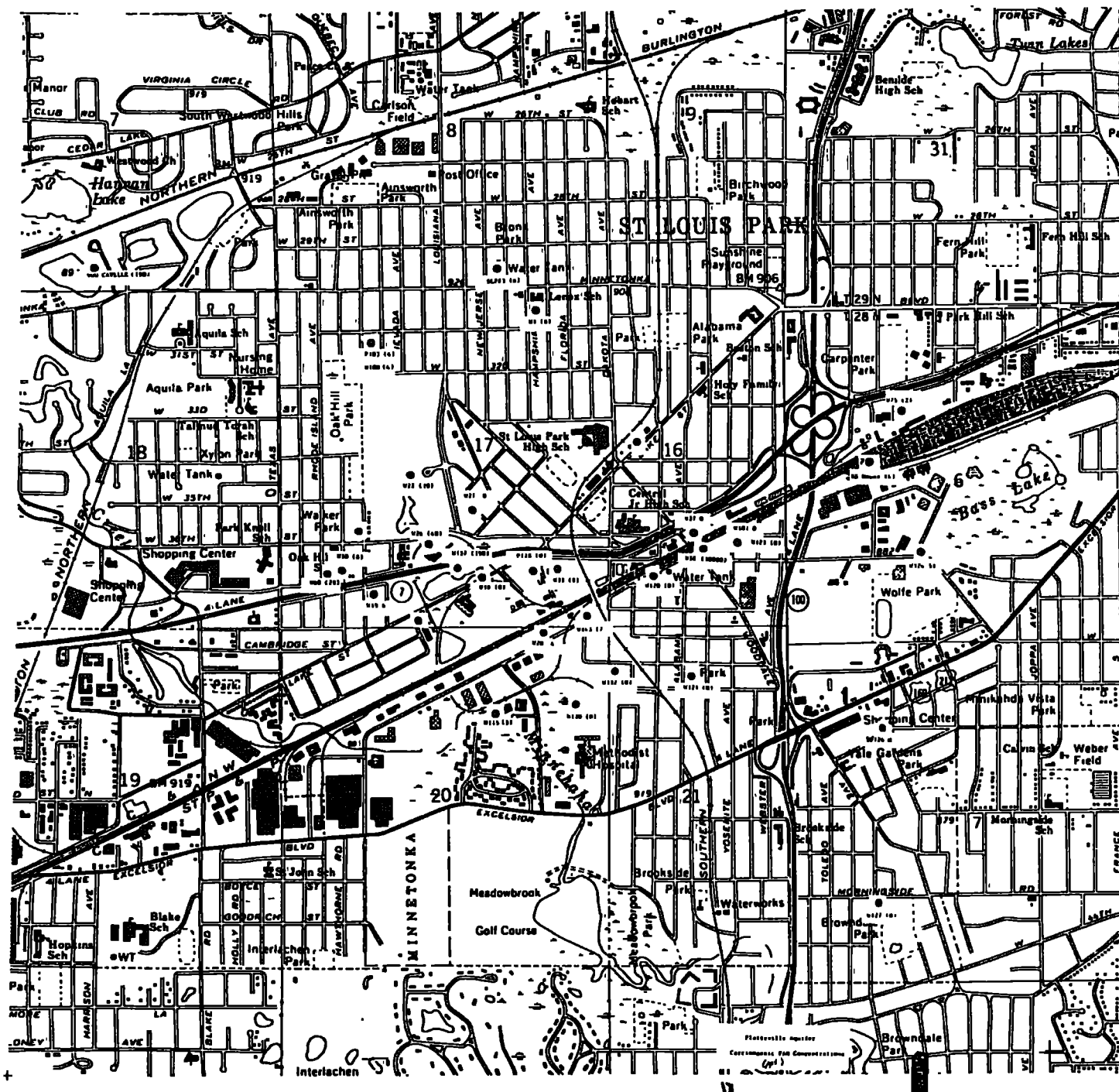


Figure 13 Platteville Aquifer Carcinogenic PAH Concentrations (ppt)

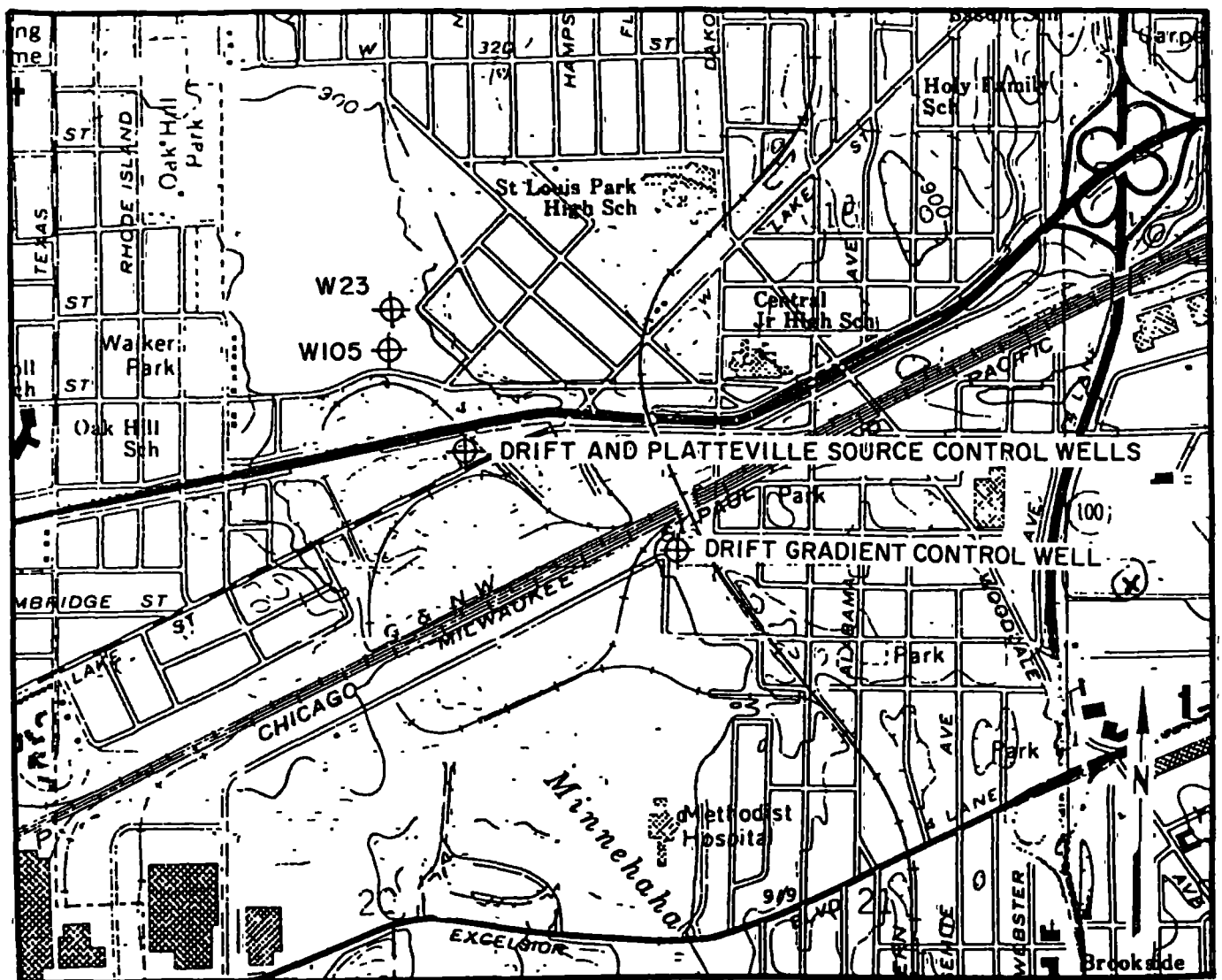


Figure 14 Location of Source and Gradient Control Wells

to prevent the further spread of contamination from the bog area south of the site and associated downgradient areas of the Drift-Platteville Aquifer (Figure 14).

History of Response Actions

A summary of previous response actions conducted by local, state, federal, and private parties, including site inspections and other technical reports and their results is included in Appendix A. Enforcement activities taken to identify responsible parties, compel private cleanup, and recover costs are summarized. A list of reference documents that currently exist in the public domain is included. The scope of the Remedial Investigation addresses the problems and questions that have resulted from previous work at the site.

Boundary Conditions and Site Map

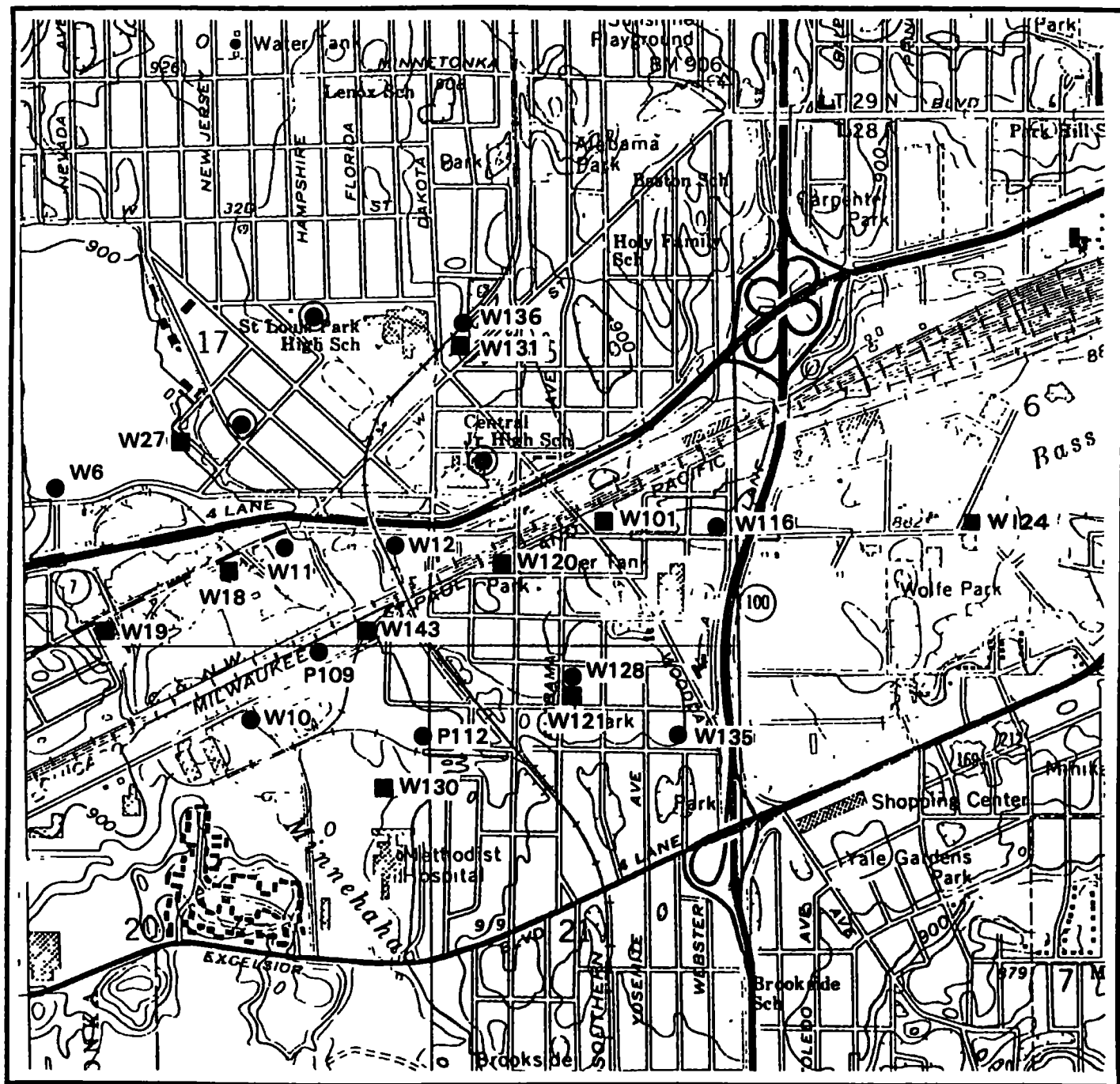
Figure 1 is a site map that shows the boundaries of the Northern Area Remedial Investigation as prescribed by the Consent Decree-RAP, Section 9.3.1.

TASK 2 PLANS AND MANAGEMENT

This section describes the location and design of three new Drift Aquifer monitoring wells and new Platteville Aquifer monitoring wells to be installed for this investigation. Also, the selection of existing Drift-Platteville Aquifer monitoring wells, to be monitored concurrently with the Northern Area Remedial Investigation, is discussed. A detailed Sampling Plan is described in a separate document that encompasses all ground-water monitoring to be done in accordance with the Consent Decree-RAP. Section B of this document is the Quality Assurance Project Plan that describes the relevant data management plans for this project. Section C contains the Health & Safety Plan, and Section D is the Community Relations Plan for this project.

Well Locations

Figure 15 shows the proposed locations for three pairs of Drift-Platteville Aquifer monitoring wells. These well locations were selected based on considerations of water quality and water level data needs. The major feature of both water quality and water level databases for the Northern Area is that there are not enough data within this area to adequately define the local ground-water flow direction or the extent and magnitude of any ground water contamination. However, based on the data presented in Task 1, it is expected that the general ground-water flow direction is west to east. Also, the general pattern of ground-water quality shows higher concentrations of contaminants nearer to the former



EXPLANATION

- EXISTING DRIFT WELLS
- EXISTING PLATTEVILLE WELLS
- ⊙ PROPOSED DRIFT AND PLATTEVILLE WELLS

SCALE
0 500 1000 2000
FEET

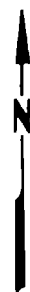


Figure 15 Location of Drift-Platteville Monitoring Wells.

Reilly site (e.g., higher PAH and phenolics concentrations in the western portion of the Northern Area compared to the eastern portion).

The possible influence that multi-aquifer wells may have on ground-water flow patterns and on contaminant distribution in the Northern Area of the Drift-Platteville Aquifer is not currently known. If multi-aquifer wells are present they would likely connect the Platteville Aquifer with lower bedrock aquifers. In some instances, multi-aquifer wells in the St. Louis Park area have been known to allow water to flow from upper aquifers to lower aquifers. This would cause a local depression in the piezometric surface of the upper aquifer. In order to determine if multi-aquifer wells are influencing the piezometric levels in the Drift-Platteville Aquifer, a detailed review of an existing well inventory will be performed (Consent Decree Part C, item 13. (b) 17). Modifications to the well locations presented in this Plan may be considered based on the results of the well inventory review. Minor modifications made to address concerns about the presence of multi-aquifer wells will only be made upon concurrence of all Project Leaders, in accordance with Part O of the Consent Decree.

The approach taken to address the data needs, given the expected hydrogeological conditions summarized previously, is to install an equal number of Drift and Platteville Aquifer wells and to provide the best possible areal coverage of the Northern Area. Equal numbers of Drift and Platteville Aquifer monitoring wells are appropriate because of the equal lack of data for both the Drift and Platteville Aquifers. Therefore, three wells completed in each unit will provide the total of six wells called for in the Consent Decree-RAP. The best areal coverage of the Northern Area is provided by locating the wells roughly midway between adjacent monitoring locations. The proposed new monitoring well locations shown in Figure 15 will provide the data necessary to complete the Remedial Investigation and perform the Feasibility Study.

The six new monitoring wells will be designated using the USGS well numbering system upon concurrence of all Project Leaders. The wells will be located in St. Louis Park, and the City will acquire necessary access agreements in those instances where others own the site where the monitoring wells will be located.

Well Design and Installation

The Drift and Platteville Aquifer monitoring wells will be constructed with four-inch diameter steel casing. The Drift Aquifer monitoring wells will be equipped with 10 foot long stainless steel screens, and the Platteville Aquifer monitoring wells will be open hole construction over the thickness of the aquifer. The Drift Aquifer monitoring wells will be completed in the Middle Drift Aquifer. The Middle Drift Aquifer is the major water-producing unit within the Drift based on thickness, areal

extent and hydraulic properties (USGS Water Supply Paper 2211). Therefore, the Middle Drift Aquifer is expected to be the major pathway for contaminants to migrate from the site in the Drift, and monitoring wells completed in the Middle Drift Aquifer are likely to detect contaminants from the former Reilly site before they would be detected in monitoring wells completed in upper or lower portions of the Drift at the same location.

The six new Drift-Platteville monitoring wells will be drilled and constructed by a licensed well contractor in accordance with the Minnesota Water Well Construction Code, and other applicable codes. The six monitoring wells will be completed within 60 days of receiving approval of this Plan, and project specifications, in accordance with the Consent Decree-RAP. Cable tool and/or mud rotary methods will be used for this work.

Figure 16 shows the Drift Aquifer monitoring well design details. A four-inch steel casing equipped with a drive shoe will be drilled and driven to the depth required. No annular space is created outside the casing, therefore no annular casing seal is required. For the Drift Aquifer monitoring well, a telescope-size stainless steel screen will be placed at the bottom of the casing. The telescope-size screen, of 3-3/4-inch outside diameter and 3-inch inside diameter, fits inside the four-inch steel well casing. The casing is then raised to expose the screen to the Middle Drift Aquifer. As the casing is raised, the sands and gravel of the Middle Drift Aquifer will collapse around the screen, so a filter pack of graded sand is not needed. A lead packer seals the space between the four inch casing and the well screen.

For the Platteville Aquifer monitoring well (Figure 17), the four-inch casing will be seated in the top of the Platteville Formation, and an open borehole will be advanced through the formation using the mud rotary drilling method. If the Glenwood Formation is penetrated during drilling, the borehole will be filled with neat cement grout from the bottom of the hole to the top of the Glenwood Formation.

At each of the three monitoring well locations the Platteville Aquifer monitoring well will be drilled first. The geologic information gained from drilling through the full thickness of the Drift Aquifer during the Platteville Aquifer monitoring well installation will be used to guide the placement of the screen for the adjacent Drift Aquifer monitoring well. The Drift Aquifer monitoring wells will be screened in a coarse sand and/or gravel zone of the Middle Drift Aquifer. Upon completion, wells will be developed by pumping, as directed by the City's filed representative. Well heads will consist of the 4-inch casing extending approximately two feet above the ground surface. Security posts will be cemented into place to protect the 4-inch well casing in accordance with the Minnesota Water Well

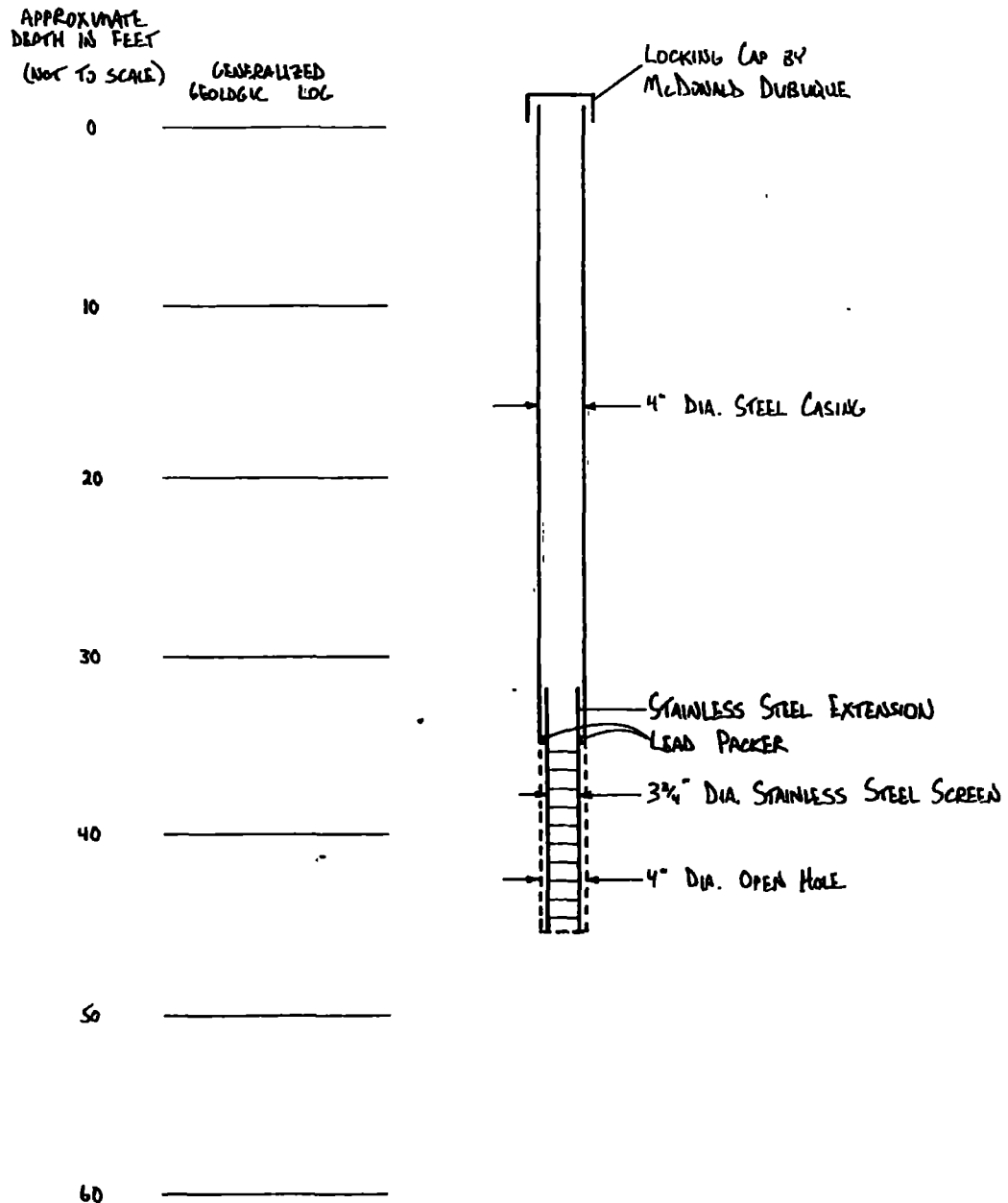


Figure 16.

DRIFT AQUIFER Monitor Well Design

APPROXIMATE
DEPTH IN FEET
(NOT TO SCALE)

GENERALIZED
GEOLOGIC LOG

10

20

30

40

50

60

70

80

90

DRIFT

PLATTEVILLE
FORMATION

GLENWOOD SHALE

LOCKING CAP BY
McDONALD DUBUQUE

4" DIA. STEEL CASING

4" DIA. OPEN HOLE

Figure 17.

PLATTEVILLE AQUIFER Monitor Well Design

Construction Code. The casing will be painted and marked with the well's project number, and regular inspections will be made to minimize vandalism.

The drilling sites will be kept neat and clean at all times. Water produced from well development will be directed to the sanitary sewer in accordance with MWCC approval (Appendix B). Drilling fluids, cuttings, decontaminant fluids, and other debris will be disposed of according to applicable regulations and in accordance with the Contingency Plan (Appendix C). Drilling tools and equipment will be steam cleaned between wells. A record containing documentation of these procedures, field notes, well logs, measurements, etc. will be maintained.

Selecting of Existing Drift-Platteville Monitoring Wells

Ground-water monitoring for PAH and phenolics in the Northern Area of the Drift-Platteville Aquifer will be conducted in conjunction with monitoring other parts of the aquifer. Specifically, Section 9.6 of the RAP requires 30 Drift-Platteville Aquifer monitoring wells to be sampled semi-annually during the first year, annually during the second and third years, thereafter, 20 wells are to be sampled biennially. Thirty candidate Drift-Platteville Aquifer monitoring wells have been chosen including W131, W136, the six new Drift-Platteville wells installed for the Northern Area Remedial Investigation, eleven other existing Drift Aquifer monitoring wells, and eleven other Platteville monitoring wells (Figure 15). The 22 other existing Drift-Platteville Aquifer monitoring wells selected for monitoring are as follows:

<u>Drift Aquifer Monitoring Wells</u>	<u>Platteville Aquifer Monitoring Wells</u>
W2, W6, W10 W11, W12	W1, W18, W19 W20, W27 W101, W120 W121, W124 W130 W143
W116, W117 W128, W135 P109, P112	

The objectives of monitoring ground-water in the Drift-Platteville Aquifer are to: 1) assess changes in the extent of contamination, and 2) to evaluate the effectiveness of the source and gradient control well systems and any other remedy implemented in the Drift-Platteville Aquifer. In order to address the first objective, Drift-Platteville Aquifer monitoring wells that provide adequate coverage of the area surrounding the contaminant source area were chosen. While only two up-gradient or cross-gradient wells were chosen (W1 and W2) most of the selected wells are spread out around the area down gradient from the site and bog contaminant source areas (Figure 15).

The second objective is addressed by selecting wells that will provide both water level and water quality data that will help assess the effectiveness of the source and gradient control well systems. In this regard, the water quality data is judged to be more significant than the water level data, because the purpose of these systems is to control the distribution of contaminants. Therefore, wells outside of the hydraulic influence of a pumping well should reflect the influence of the pumping well on water quality in the aquifer. Also, the pumping wells themselves will be monitored quarterly in accordance with the RAP, and pumping test data will be used to determine the hydraulic influence of the pumping wells. Therefore, the wells shown on Figure 15 are selected primarily for the water quality samples they will provide.

TASK 3 SITE INVESTIGATION

The six monitoring wells will be installed within 60 days of receiving approval pursuant to Part G of the Consent Decree. The wells will be constructed and completed in accordance with this Plan. The well installation work is part of a hydrogeologic investigation to determine the nature and extent of ground-water contamination, and no waste characterizations or soils and sediment investigations are relevant.

Within 30 days of completing the new monitoring well installations, ground-water samples will be collected for analyses. Before the samples are taken a survey will be conducted to determine the horizontal position of each well and the vertical elevation of the measuring points. Water levels will then be measured and ground-water quality samples will be taken at the new wells and at existing wells identified above. These wells shall be re-sampled within 6 months of the first sampling round. All sampling, analyses, and water level measurements will be done in accordance with the approved Sampling Plan as stipulated in section 3.2 of the RAP.

TASK 4 SITE INVESTIGATION ANALYSIS

This task was previously performed during the Consent Decree-RAP negotiations and the results are reflected in that document. Therefore, no separate site investigation analysis will be performed for this project.

TASK 5 LABORATORY AND BENCH-SCALE STUDIES

This task is not required because additional studies are not necessary to fully evaluate remedial alternatives. The preliminary remedial alternatives were evaluated during the Consent Decree-RAP negotiations, and the results are reflected in that document. The Feasibility Study will look at all remedial action alternatives with emphasis on the preferred alternative of gradient control.

TASK 6 REPORTS

The requirements for status reports for all activities carried out in accordance with the Consent Decree-RAP are described in that document. No separate progress reports will be prepared for this project.

A final report summarizing the results of this investigation will be prepared in accordance with U.S. EPA "Guidance on Remedial Investigations Under CERCLA" (dated June 1985) in order to meet the requirements of the Consent Decree-RAP. However, in following said guidance, the City of St. Louis Park relinquishes no rights granted it under the applicable Parts of the Consent Decree. The final Remedial Investigation report will be submitted within 90 days of completing the second round of ground-water sampling described in Task 3. The report will contain all boring logs, well completion details, analytical data, water level measurements, and other information obtained during this investigation. The purpose and objectives of the final report involve comparing the ground-water quality data from the Drift-Platteville Aquifer monitoring wells to the historical data and to the criteria established in the Consent Decree-RAP to determine if contamination exists. A hydrogeologic evaluation will be made to determine if any present contamination is spreading.

APPENDIX A
HISTORY OF RESPONSE ACTIONS

The following background and history of response actions is an excerpt from the MPCA Board Item on April 22, 1986 "Request for Approval of a Consent Decree with the Reilly Tar & Chemical Corporation and Other Parties for the Purpose of Completing Remedial Investigations and Feasibility Studies and Developing and Implementing Response Actions at and Around the Reilly Tar Site in St. Louis Park". This material is in Section I of the Issue Statement of that MPCA Board Item.

Between 1917 and 1972, Reilly Tar & Chemical Corporation (Reilly) operated a coal tar distillation and wood preserving plant, known as the Republic Creosote Company, in St. Louis Park. This plant was located on an 80 acre tract near State Highway 7 and Louisiana Avenue (the Reilly Site; Figure 1). Reilly disposed of wastewater from the operation in a network of ditches which discharged into a swamp south of the Reilly Site. In addition, the wood treating activities conducted on the Reilly Site resulted in creosote and coal tar contamination of the soils from drippings and spills. The major constituents of coal tar are phenolic compounds and polynuclear aromatic hydrocarbons (PAH). Some PAH compounds are carcinogenic, and are thus a source of concern when a municipal drinking water supply is contaminated with these compounds. (As used in the remainder of this board item, "contaminated" or "contamination" means PAH or phenolics are present in soil or ground water resulting from activities of Reilly at the Reilly Site.)

In 1932, the first municipal well in St. Louis Park (Old SLP #1) was constructed at Brunswick Avenue and West 36th Street, approximately one-half mile east of the Reilly Site. The well was finished in the Prairie du Chien-Jordan aquifer (Figure 2). After several weeks of operation, the well was closed due to taste and odor complaints (the taste was described as "swampy"). Laboratory tests showed that phenolic compounds were the apparent cause of the problem. Phenolics cause water to have an unpleasant taste and odor when the water is chlorinated, but these compounds are not believed to have adverse health effects at the low levels which cause the taste and odor problems.

Attempts to remedy the situation were unsuccessful, and the well was abandoned. Well drillers at the time speculated that the Reilly Site might be the source of the problem. Although Reilly, at the time, insisted that the problems at the municipal well were the result of "decaying vegetation" from the swamp south of the Reilly Site, it filled an unused well (W105) located on the Reilly Site with sand and extended the casings in Reilly's main water supply well (W23) to reduce interaquifer flow of possibly contaminated water.

Complaints from nearby residences over contamination of shallow wells and of odors from air emissions became more common, especially after extensive residential development of the area during the late 1940's into the 1950's. Because of continuing problems with soil and surface water contamination and odors 1/, the City of St. Louis Park (City) and the Minnesota Pollution Control Agency (MPCA) through the Attorney General (the State) filed suit against Reilly in 1970. In 1972, the City purchased the Reilly Site from Reilly, and

1/ See paragraph thirteen, page 9, of the attached Consent Decree for a listing of various studies and/or reports, chemical analysis and field investigations relating to the Reilly Site.

the plant was dismantled and removed. The City intended to use the property for a realignment of Louisiana Avenue and for residential development, and dropped its lawsuit against Reilly as a condition of the sale. However, the State did not drop the lawsuit, which is still pending and will be dismissed as part of the proposed settlement.

In 1974, the City contracted with Gerald Sunde, a consulting engineer, to investigate pathways for the movement of contaminants. Sunde concluded that wells in the area open to several aquifers (multi-aquifer wells) provide a significant pathway for the spread of contamination from contaminated surficial aquifers to deeper aquifers which would otherwise be protected from contamination by several bedrock layers. In 1975, the MPCA contracted with Barr Engineering to investigate subsurface contamination at and south of the Reilly Site. The results of this study showed significant contamination of soil and the surficial aquifer (the drift) with creosote. Because it appeared that Sunde's assessment of the pathways for contamination to deep aquifers was, at least in part, correct, the Minnesota Department of Health (MDH) in 1978 and 1979 contracted for the closure of 29 multi-aquifer wells in areas where the surficial aquifers were the most contaminated. In addition, the City and the U.S. Geological Survey installed a packer and casing in the former Reilly well, W23, to stop the extensive downhole flow of contaminated water into the Prairie du Chien - Jordan Aquifer.

Louisiana Avenue was constructed through the Reilly Site during the mid-1970's, and some multi-family housing units were constructed in the northern half of the Reilly Site during this same time period.

In 1978 the MDH began analyses of water from municipal supply wells in St. Louis Park and neighboring communities for PAH using high performance liquid chromatography. These and subsequent analyses led to the discovery of significant concentrations of PAH in six St. Louis Park wells and one Hopkins well, and these wells were shut down during the period 1978-81.

As a result of the determination that area ground water was contaminated the State amended, in 1978, its complaint in the lawsuit with Reilly to include claims for ground water contamination. All of the municipal wells cited above are finished in the Prairie du Chien-Jordan aquifer, which is the most heavily used aquifer for municipal drinking water supplies in the Twin Cities metropolitan area. The City of St. Louis Park has since overcome part of the resulting water supply shortfall through water conservation measures, installation of a new well in the Mt. Simon-Hinckley aquifer, and an interconnection with the City of Plymouth. In an attempt to understand the processes of contaminant transport in the Prairie du Chien-Jordan, the MDH and MPCA contributed toward a ground water flow and contaminant transport modeling study performed by the United States Geological Survey (USGS). In addition, the MDH funded a study by Hickok and Associates of the feasibility of ground water gradient control 2/ in 1981.

The MPCA received a \$400,000 grant from the U.S. Environmental Protection Agency (EPA) in December, 1981, and used this grant to finance a feasibility study conducted by the MPCA contractor, CH2M Hill, for replacement or treatment

2/ The term "gradient control", as used in this discussion, refers to the utilization of a pumping well or wells, usually located near the leading edge of the contamination plume, to control the flow of ground water in an aquifer to contain contamination within the area of control. It is in contrast to "source control", in which highly contaminated water is pumped at or near the source.

of the lost water supply; and to locate, investigate, and close multi-aquifer wells. In December, 1982, the EPA awarded the MPCA a \$1.99 million grant under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to continue these studies, and to provide more funding for the USGS ground water modeling study for the purpose of designing a gradient control well system to control the movement of contaminants in the Prairie du Chien-Jordan aquifer.

The results of these studies have provided sufficient information to design a remedial approach for the contamination in the Prairie du Chien-Jordan aquifer. Multi-aquifer well investigation under the CERCLA grant has been limited to date, to two priority wells located on the Reilly Site. The most important of these, W23, was found to have a plug of coal tar in it, and has been cleaned out. The other well, W105, was the water supply well for the sugar beet plant which occupied the Reilly Site around the turn of the century, and was used by Reilly as a backup supply well until 1933. W105 was not found to be a source of contamination as was W23. The drinking water restoration study conducted by CH2M Hill, which analyzed the feasibility of various methods of treating drinking water, deeper wells, and an interconnection with Minneapolis, concluded that treatment with granular activated carbon (GAC) was the most cost-effective method of restoring the City's lost water supply. The USGS has completed its ground water flow modeling work, and this model has been used to examine gradient control schemes.

In September, 1980, the EPA filed suit against Reilly alleging violation of the Resource Conservation Recovery Act (RCRA). The State and St. Louis Park joined the lawsuit in October, 1980, followed by the City of Hopkins in June, 1981. After passage of CERCLA, the State filed an amended complaint in May, 1981, followed by St. Louis Park, the EPA, and Hopkins respectively in

August, September, and October, 1981. The State filed a second amended complaint under the Minnesota Environmental Response and Liability Act ("MERLA") in 1985 followed by St. Louis Park and Hopkins. In the event that agreement is not reached on the Consent Decree, the case is scheduled to be heard before U.S. District Court Judge Paul Magnuson.

In addition to the above litigation, Reilly filed a counterclaim against St. Louis Park, and St. Louis Park asserted a cross-claim against the State. Other parties involved with the purchase and development of the northern portion of the Reilly Site filed cross-claims against St. Louis Park and Reilly. 3/

In May, 1983, Reilly and its consultant, Environmental Research & Technology, Inc. (ERT) issued a report on the St. Louis Park ground water contamination. Discussion among MPCA, EPA, Reilly and ERT staff led to a period of negotiations toward a settlement. These talks broke down in early 1984.

Both the MPCA and EPA have instituted administrative action against Reilly, pursuant to the respective State and federal Superfund acts, in order to compel Reilly to undertake necessary remedial actions. The EPA issued a Record of Decision (ROD) in June, 1984 affirming that the most cost-effective remedy for restoring the City's lost water supply was installation of a GAC treatment system. In August, 1984, the EPA issued to Reilly an Administrative Order directing Reilly to design and construct the GAC system for City wells SLP 10 and 15 as provided in the ROD. In December, 1984, the MPCA issued a Request for Response Action (RFRA) to Reilly outlining a range of remedial investigations, feasibility studies, and necessary remedial actions.

3/ The following organizations were included as defendants in the lawsuit because they were involved with the purchase and development of the northern portion of the Reilly Site from St. Louis Park: Housing and Redevelopment Authority of St. Louis Park, Oak Park Village Associates, and Philips Investment Co.

Following these administrative actions, extensive negotiations, which had previously broken down, resumed among the MPCA, EPA, St. Louis Park, and Reilly in an effort to reach an effective settlement. General agreement on the terms and conditions of a proposed Consent Decree was reached in the Summer of 1985. However, because of its complex nature and the large number of parties involved, final agreement was delayed. Since the likelihood of settlement was always present, the MPCA staff did not return to the MPCA Board for further administrative actions.

Since general agreement regarding a Consent Decree had been reached in mid 1985, Reilly did proceed to design and construct a GAC system for City wells SLP 10 and 15. Reilly completed the construction of the GAC system in December, 1985 and the system is expected to be operational by May, 1986.

The following background and history of response actions is Part C of the Consent Decree. A list of relevant reference documents is included.

1. From 1917 until 1972, Reilly was engaged in the business of coal tar distillation and pressure treatment of wood products at its plant site at 7200 Walker Street, St. Louis Park, Hennepin County, Minnesota (hereinafter "the Site"). The Site encompassed an eighty (80) acre tract, which consists of Lot 1, Block 1; Lot 1, Block 2; Lot 1, Block 3; Lot 1, Block 4; Lot 1, Block 5; Lot 1, Block 6; Lot 1, Block 7; Lot 1, Block 8; Lot 1, Block 9; Lot 1, Block 10; all in Oak Park

Village according to the plat thereof on file in the office of the County Recorder of Hennepin County, Minnesota.

2. On or about October 2, 1970, the State, through its Pollution Control Agency, and St. Louis Park, filed a complaint in the Hennepin County District Court of the State of Minnesota alleging violations by Reilly of state and municipal pollution control laws and regulations. State of Minnesota by the Minnesota Pollution Control Agency, and the City of St. Louis Park v. Reilly Tar & Chemical Corporation, Hennepin County District Court, Civil File No. 670767 (hereinafter "Hennepin County Lawsuit").

3. On April 14, 1972, St. Louis Park agreed to purchase the Site from Reilly. The purchase agreement included a promise by St. Louis Park to obtain dismissals with prejudice by the State and by St. Louis Park of the Hennepin County Lawsuit. The purchase agreement also provided for acceptance by St. Louis Park of the property in an "as is" condition, including "any and all questions of soil and water impurities and soil conditions," and an agreement by St. Louis Park "to make no claim against Reilly for damages relative to soil and water impurities, if any, in any way relating to the premises sold herein, or relative to any other premises in which the City of St. Louis Park holds an interest. . . ."

4. A closing was scheduled on the property for June 19, 1973. However, the State did not execute a dismissal

of the Hennepin County Lawsuit. Accordingly, the City of St. Louis Park agreed that it would "hold Reilly harmless from any and all claims which may be asserted against it by the State of Minnesota, acting by and through the Minnesota Pollution Control Agency, and will be fully responsible for restoring the property, at its expense, to any condition that may be required by the Minnesota Pollution Control Agency". The City of St. Louis Park and Reilly executed and filed dismissals with prejudice of their claims in the Hennepin County Lawsuit, and the closing took place thereafter.

5. On June 21, 1973, the property was conveyed by quitclaim deed from St. Louis Park to the Housing and Redevelopment Authority of St. Louis Park, Minnesota, which thereafter conveyed part of the property to Oak Park Village Associates, Rustic Oaks Condominium, Inc. and Philip's Investment Co.

The Agreement for Purchase and Sale of Real Estate dated October 4, 1977 and the First Addendum to the Agreement dated October 6, 1977 between the St. Louis Park Housing and Redevelopment Authority and Diversified Equities Corporation [Oak Park Village Associates] regarding Lot 1, Block 3, Oak Park Village, Hennepin County, Minnesota, provides as follows:

14. Environmental Matters

The Agency [St. Louis Park Housing and Redevelopment Authority] shall prepare and shall incur all expenses for any environmental approvals, assessments, environmental impact

statements or such other environmental review documents deemed necessary or desirable by governmental authority.

Agency [St. Louis Park Housing and Redevelopment Authority] agrees to indemnify and save Redeveloper harmless from and against any and all loss or damage Redeveloper or successors may suffer from damage to improvements constructed on the Property as a result of claims, demands, costs or judgments against and arising out of soil or ground water contamination existing as of the date hereof, or caused by conditions existing as of the date hereof.

The Agreement for Purchase and Sale of Real Estate dated June 1, 1979 by and between the Housing and Redevelopment Authority of St. Louis Park and Ben Weber [Philip's Investment Co.] and the City of St. Louis Park regarding Lot 1, Block 6, Oak Park Village, Hennepin County, Minnesota, provides as follows:

14. Environmental Matters.

a. Both the City and the Redeveloper agree that the Stipulation between the City and the PCA dated April 19, 1977, is capable of a possible variety of interpretations. As between the Agency [St. Louis Park Housing and Redevelopment Authority], the City and the Redeveloper, as an inducement to the City and Agency to allow the Redeveloper to develop the Property and as security against the Redeveloper, or its assigns or successors in interest, claiming the right to benefit from a broader interpretation of said Stipulation and as an inducement to the Redeveloper to develop the Property and as security against the City or Agency claiming the right to benefit from a narrower interpretation of said Stipulation, the City, Agency and Redeveloper agree that, as between the parties to this Agreement, this paragraph 14 shall constitute the sole remedy available to Redeveloper against the City and Agency for any action or claim against or loss or damage to the

Redeveloper which is based on, derived from, or related to the soil or groundwater conditions of the Property, and shall constitute, as between the parties to this agreement, their interpretation of the Stipulation.

b. The City will not require the Redeveloper to excavate soil from the Property in question because of soil or groundwater contamination resulting from the operations of the former Republic Creosote Plant.

c. The City will indemnify the Redeveloper from damage consisting of physical destruction or injury to improvements on the property due solely to soil excavation on the Property required by public agencies. This indemnification shall not include consequential damage, lost income, lost profit or other forms of indirect loss or damage nor shall it include damage arising from personal injury. Indemnification shall be on a replacement cost less depreciation basis.

d. The indemnification granted by this agreement shall be secondary to any other rights or potential rights which the Redeveloper may have to compensation for any damage or loss whether through eminent domain, grants or otherwise. The Redeveloper shall exercise good faith effort to seek and obtain such compensation before presenting a claim under this indemnification agreement. Any compensation from any other source for damages indemnified herein shall reduce the indemnification liability of the City dollar per dollar.

e. This indemnification and agreement shall not be assignable except to the first mortgagee and shall terminate on January 1, 1985. All claims to indemnification under this agreement must be made in writing and received by the City Clerk of the City prior to January 2, 1985.

6. In April, 1978, the State moved to amend its complaint in the Hennepin County Lawsuit, alleging that PAH substances contained in Reilly's coal tar and creosote wastes had entered the ground water beneath the Site and that their

further migration threatened to contaminate aquifers relied on for public water supply. At the same time, St. Louis Park moved to intervene as a plaintiff. The motions were granted and interlocutory review was denied by the Minnesota Supreme Court. Reilly subsequently tendered defense of the action to St. Louis Park and counterclaimed against St. Louis Park, asserting that St. Louis Park was responsible for dealing with this problem under the hold harmless agreement made at the time of its purchase of the Site.

7. On or about September 4, 1980, the United States commenced this action by filing a complaint under Section 7003 of the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. § 6973, alleging, inter alia, the existence of an imminent and substantial endangerment to health and the environment due to the handling, treatment, storage, transportation, disposal and presence of hazardous waste at the Site. On or about October 15, 1980, the State and St. Louis Park were granted leave to intervene in the RCRA Section 7003 claim and to assert additional claims under Minnesota law. On or about June 16, 1981, Hopkins was granted leave to intervene in the RCRA Section 7003 claim and to assert additional claims under Minnesota law.

8. On or about September 9, 1981, the United States filed an amended complaint, alleging in addition to the RCRA § 7003 claim, claims under Sections 106 and 107 of the

Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606 and 9607.

9. On or about May 27, 1981, the State filed an amended complaint, asserting claims under Section 7003 of RCRA, 42 U.S.C. § 6973, Section 107 of CERCLA, 42 U.S.C. § 9607, Minn. Stat §§ 115.061, 115.07, 115.071, and Minnesota Rule WPC 4(b) [Minn. Rule Part 7100.0020], and Minnesota common law.

10. On or about August 31, 1981, and October 16, 1981, respectively, St. Louis Park and Hopkins filed amended complaints alleging, inter alia, claims under Section 7003 of RCRA, 42 U.S.C. § 6973, Section 107 of CERCLA, 42 U.S.C. § 9607, Minn. Stat. Chapter 116B, and Minnesota common law.

11. On or about April 5, 1985, the Court granted the State's motion for leave to file a second amended complaint, adding claims under the Minnesota Environmental Response and Liability Act ("MERLA"), Minn. Stat. Ch. 115B. The State subsequently filed such a second amended complaint. Pursuant to stipulations, St. Louis Park and Hopkins later also filed second amended complaints, each of which added MERLA claims.

12. Reilly, in its answers to the various complaints referenced above, has denied and continues to deny liability, has raised several affirmative defenses, and has asserted a counterclaim against St. Louis Park. Various other Parties have asserted cross-claims, including a cross-claim by St. Louis Park against the State, a cross-claim of Oak Park Village

Associates against the Housing and Redevelopment Authority of St. Louis Park and a cross-claim of Philip's Investment Co. against Reilly.

13. Since 1969, a number of studies and/or reports, chemical analyses and field investigations relating to the Site have been undertaken. By listing the items below, the Parties do not necessarily endorse the accuracy, correctness, precision, quality, or validity of the information and opinions contained therein. These analyses, investigations and studies include but are not limited to the following:

(a) Studies and/or Reports

- (1) "Ground Water Investigation Program at St. Louis Park, MN," by E. A. Hickok & Associates, Inc., September, 1969.
- (2) "Memorandum of Waste Disposal at Republic Creosote Co. and Reilly Tar & Chemical Co.," by Minnesota Pollution Control Agency (MPCA Board Item), April, 22, 1970.
- (3) "An Assemblage of Analytical Data Regarding the Reilly Tar & Chemical Property, St. Louis Park, Minnesota," by the St. Louis Park Health Department, August 1, 1972.
- (4) "Status Report on Creosote Site and TexaTonka Area", prepared by the St. Louis Park Planning Department, January 11, 1973.
- (5) "Surface and Subsurface Ground Reclamation; Republic Creosote Site, City of St. Louis Park", prepared by OSM Consulting Engineers, April 23, 1973.

- (6) "Storm Water Study; Public Improvement #72--43 (Republic Creosote Area)," prepared by OSM Consulting Engineers, August 6, 1973.
- (7) "Geology of the St. Louis Park Area - A Review by the Minnesota Geological Survey; Report on Investigation of Municipal Water Supply, St. Louis Park," prepared by the Minnesota Department of Health, March 1974.
- (8) "Soil Investigation; Proposed Storm Sewer and Holding Ponds near Highway 7 and Louisiana Avenue, St. Louis Park," prepared by Soil Exploration Co., April 16, 1974.
- (9) "Hydrogeologic Study of the Republic Creosote Site," prepared by Gerald Sunde, Consulting Engineer, July, 1974.
- (10) "Report on Investigation of Phenol Problem in Private and Municipal Wells in St. Louis Park, Minnesota," prepared by Minnesota Department of Health, September, 1974.
- (11) Memorandum from F. F. Heisel, Minnesota Department of Health, to P. Gove, Minnesota Pollution Control Agency. "St. Louis Park Creosote Contamination Study," November 14, 1975.
- (12) "Data Regarding The History and Development of a Storm Sewer System for the City in the Area of the Former Republic Creosote Property," prepared by the City of St. Louis Park, November 15, 1974.
- (13) "Memorandum on Groundwater Contamination, St. Louis Park, MN," by Minnesota Pollution Control Agency, (MPCA Board Item) November 19, 1974.
- (14) "Memorandum on St. Louis Park Groundwater Situation," by the Minnesota Pollution Control Agency, (MPCA Board Item) December 13, 1974.

- (15) "Soil and Ground Water Investigation Coal Tar Distillation and Wood Preserving Site, St. Louis Park - Phase I Report," prepared by Barr Engineering Co., May 1976.
- (16) "Stability Study of Para Benzo Quinone for the City of St. Louis Park," prepared by Sanitary Engineering Laboratories Inc. (SERCO), June 1976.
- (17) "Soil Boring and Chemical Analysis of the Northern Portion of Oak Park Village," prepared by National Biocentric, Inc., September 17, 1976.
- (18) "Soil Contamination by Creosote Wastes," prepared by National Biocentric, Inc., November 1, 1976.
- (19) "Development Plan, Northern Portion, Oak Park Village," prepared by St. Louis Park, December 2, 1976.
- (20) "Review of Recent Studies of Soil Contamination at the Former Republic Creosote Site - Recommendations to City's Proposed Development Plan," by Minnesota Pollution Control Agency, December 28, 1976.
- (21) "Soil and Ground Water Investigation Coal Tar Distillation and Wood Preserving Site, St. Louis Park - Phase II Report," prepared by Barr Engineering Co., June 1977.
- (22) "Assessment of Possible Human Health Effects Resulting from Contamination of the Former Republic Creosote Site," prepared by the Minnesota Department of Health, October 1977.
- (23) "Soil Report; Prepared by Oak Park Village, St. Louis Park, Minnesota," prepared by Soil Testing Service of Minnesota, Inc., January 5, 1978.
- (24) "Recommendations for Plugging or Modification of Abandoned Wells in the

Area of the Former Republic Creosote Plant," prepared by the City of St. Louis Park, January 11, 1978.

- (25) "Report of Well Water Survey, St. Louis Park, Minnesota," prepared by Sanitary Engineering Laboratories, Inc., (SERCO) June-July 1978.
- (26) "Report on the Existing Creosote Problem in St. Louis Park, Minnesota," prepared by James Bailey, Agricultural Engineering, University of Minnesota, July 1, 1978.
- (27) "Health Implications of Polynuclear Aromatic Hydrocarbons in St. Louis Park Drinking Water," prepared by the Minnesota Department of Health, November 1978.
- (28) "Status Report to the MPCA: Proposed Development, Oak Park Village," prepared by St. Louis Park, November 14, 1978.
- (29) "Water Quality Development in Oak Park Village," prepared by St. Louis Park Planning Department, December 15, 1978.
- (30) "Letter Report Tabulating Information on Existing Wells in St. Louis Park," prepared by United States Geological Survey, February 6, 1979.
- (31) "Status Report: St. Louis Park Development," by the Minnesota Pollution Control Agency (MPCA Board Item), March 27, 1979.
- (32) "Progress Report: Investigation of Coal Tar Derivatives in Ground Water - St. Louis Park," prepared by the United States Geological Survey, April 13, 1979.
- (33) "Epidemiologic Investigation of Third National Cancer Survey Data for St. Louis Park, Edina, Richfield and Minneapolis St. Paul SMSA with a

Historical Review of St. Louis Park's Water Supply," prepared by Kari Dusich, September 1979.

- (34) "Emergency Pumpout Well For Reilly Tar Site, St. Louis Park, Minnesota," prepared by Ecology and Environment, Inc., 1980.
- (35) "Examination of Cost Estimate For Three Tasks to be Completed For The Reilly Tar and Chemical Project, St. Louis Park, MN," prepared by Ecology and Environment, Inc., 1980.
- (36) "Summary Report on the City of St. Louis Park Activated Carbon Pilot Plant Study," prepared by Sanitary Engineering Laboratories, Inc., (SERCO), January 11, 1980.
- (37) "Cancer Rates in a Community Exposed to Low Levels of Creosote Components in Municipal Water," prepared by Dusich, Sigurdson, Hall, Dean, Minnesota Medicine, November 1980.
- (38) "Preliminary Evaluation of Ground Water Contamination by Coal Tar Derivative, St. Louis Park, MN," prepared by the United States Geological Survey, January 1981.
- (39) "Report on Drinking Water Treatment and Remedy Evaluation for St. Louis Park, MN," prepared by Eugene A. Hickok and Associates, Inc., April 1981.
- (40) "Report and Statistic - Water Quality: Results of St. Louis Park Water Samples," prepared by H. Taylor, United States Geological Survey, June 10, 1981.
- (41) "Study of Ground Water Contamination in St. Louis Park, MN," prepared by Eugene A. Hickok & Associates, et. al., November 1981.
- (42) "Dispersion and Sorption of Hydrocarbons in Aquifer Material," by

G. Cohn (thesis) University of Minnesota, 1982.

- (43) "Terminating An Endless Search: An Action Approach to Solving the Water Problem," prepared by St. Louis Park, January 11, 1982.
- (44) "Request for Authorization to Negotiate and Enter into Cooperative Agreement with the U.S. EPA to Obtain Funds for Additional Cleanup Work at the Reilly Tar Site, St. Louis Park," by the Minnesota Pollution Control Agency (MPCA Board Item), May 25, 1982.
- (45) "Degradation of Phenolic Contaminants in Ground Water by Anaerobic Bacteria: St. Louis Park, MN," prepared by Erlich, Goerlitz, Godsy & Hult, United States Geological Survey, November 1982.
- (46) "Evaluation of Groundwater Treatment and Water Supply Alternatives for St. Louis Park, MN," prepared by CH2M Hill, 1982-1983.
- (47) "Recommended Plan for a Comprehensive Solution of the Polynuclear Aromatic Hydrocarbon Contamination Problem in the St. Louis Park Area," prepared by Environmental Research & Technology, Inc. for Reilly Tar & Chemical Corporation, April 1983, plus Errata, June 27, 1983 and November 27, 1984.
- (48) "Health Risk Assessment and Environmental Effects of Compounds Contaminating St. Louis Park Groundwater: Selected Two - and Three - Ring Heterocycles and Indene," prepared by Stephen M. Mabley, Minnesota Department of Health, Section of Health Risk Assessment, July 1983.
- (49) "Evaluation of Activated Carbon Treatment Alternative for Polynuclear Aromatic Hydrocarbon Removal for Groundwater in the St. Louis Park Area," prepared by Calgon Carbon Corporation, November 18, 1983.

- (50) "Request for Authorization to Negotiate and Execute an Amendment to the Current Cooperative Agreement with the U.S. Environmental Protection Agency for Investigation and Remedial Action at the Reilly Tar and Chemical Company Hazardous Waste Site in St. Louis Park," by the Minnesota Pollution Control Agency (MPCA Board Item), November 22, 1983.
- (51) "Assessment of Groundwater Contamination by Coal Tar Derivatives, St. Louis Park Area, MN", prepared by M. F. Hult, United States Geological Survey, Open File Report 84-867, 1984.
- (52) "Record of Decision, Remedial Action Alternative Selection," prepared by the United States Environmental Protection Agency, June 6, 1984.
- (53) "Evaluation of Granular Activated Carbon for the Removal of Polynuclear Aromatic Hydrocarbons from Municipal Well Water in St. Louis Park, MN," prepared by Calgon Carbon Corporation, September 10, 1984.
- (54) "Sampling and Analysis Plan for Calgon Accelerated Column Testing of SLP 15 Water," prepared by Environmental Research & Technology, Inc., October 25, 1984.
- (55) "Request for Issuance of a Request for Response Action to the Reilly Tar and Chemical Corporation Regarding Contamination At and Around the Reilly Tar Hazardous Waste Site in St. Louis Park," by the Minnesota Pollution Control Agency (MPCA Board Item), December 18, 1984.
- (56) "Ground-water Flow in Prairie du Chien Jordan Aquifer Related to Contamination by Coal Tar Derivatives, St. Louis Park, MN," prepared by J. R. Stark and M. F. Hult, United States Geological Survey, 1985.

- (57) "Calgon ACT Study: Initial Results from the Accelerated Column Test of PAH Removal Performance for Activated Carbon Treatment of Water From SLP 15," prepared by Twin City Testing, January 11, 1985.
- (58) "Calgon ACT Study: Further Results From the Study of PAH Removal by Activated Carbon Treatment," prepared by Twin City Testing, January 30, 1985.
- (59) "Reilly Tar and Chemical: Analysis of Water From Three St. Peter Wells," prepared by Twin City Testing, January 31, 1985.
- (60) "Accelerated Column Test for Removal of Polynuclear Aromatic Hydrocarbons from Contaminated Groundwater," prepared by Calgon Corporation, March 8, 1985.
- (61) "PAH Analysis by GCMS," prepared by Twin City Testing March 26, 1985
- (62) "Draft Work Plan R1, Reilly Tar Site, St. Louis Park, Minnesota," prepared by CH2M Hill and Ecology & Environment, April 27, 1985.
- (63) "Predesign Memorandum Evaluation of Granular Activated Carbon System Alternatives For Removal of Polynuclear Aromatic Hydrocarbons From Municipal Well Water in St. Louis Park, Minnesota", prepared by Ch2M Hill, May 29, 1985.
- (64) "PAH Threshold Odor Determination in St. Louis Park Municipal Supply Water," prepared by Environmental Research and Technology, Inc., May 30, 1985.
- (65) "Volatile Organic Analysis of the St. Louis Park Municipal Drinking Water Supply System, March, 1985," prepared by Environmental Research & Technology, Inc., May 30, 1985.
- (66) Feasibility of Community-Wide Epidemiologic Studies of Drinking Water and Health: St. Louis Park and New Brighton", prepared by the Minnesota Department of Health, December 31, 1985.

- (b) Field investigations and chemical analyses of water (surface and/or ground water) and soils, including associated field notes, chain of custody records, raw data sheets, sampling analysis protocols, boring and well logs and water level measurements. In general, the results of soil borings and water samples are found in the list of studies and/or reports under Part C. 13(a). (Dates listed usually reflect the time of the investigation.)
- (1) Preliminary soil investigation for the engineering properties of the soil, performed by Soil Engineering Services, Inc., October 13, 1969.
 - (2) Mellon-Rice data on well water and plant wastewater samples, Carnegie-Mellon University and C.W. Rice Division, NUS, November 5, 1970.
 - (3) Soil sample analyses, Tri-City Public Health Lab, 1971 and 1973.
 - (4) Analysis of soil and water samples from the St. Louis Park area, by the Minnesota Department of Health, 1973 to present.
 - (5) Analysis of soil and water samples by Twin Cities Testing and Engineering Laboratory, Inc., and Soil Exploration Company, 1974 to present.
 - (6) Analysis of soil and water samples by Sanitary Engineering Laboratories, Inc. (SERCO), 1975, 1976, 1977, 1978 and 1982.
 - (7) Soil borings performed by Braun Engineering, 1974, 1979, 1980, and 1982.
 - (8) Well investigations pursuant to well abandonment program performed by Minnesota Department of Health, 1978-present.
 - (9) Analysis of soil and water by United States Geological Survey, 1978-present.

- (10) Analyses of groundwater, by Pace Laboratories, Inc., 1978-1980, 1983-1984 (1983-1984 analyses performed by Rocky Mountain Analytical Laboratory).
- (11) "Results of Analysis of Water Samples, and Soil Samples for Polynuclear Aromatic Compounds (Hydrocarbons, Azarene, Phenols)", by Midwest Research Institute, October 7, 1981.
- (12) Analyses of Ground Water, by Capsule Laboratories, Inc., 1981, 1982, and 1983.
- (13) Soil borings and analyses by GCA Corp., 1982-1983.
- (14) Water analyses by Monsanto Research Corp., 1982-1984.
- (15) Water analyses by Environmental Testing and Certification Corporation, 1983.
- (16) Soil boring and chemical analyses by National Biocentric, Inc., 1976.
- (17) St. Louis Park area water well search and inventory questionnaires, prepared by E. A. Hickok and Associates, Inc., 1982-1983.
- (18) Progress reports on the investigation and clean-out of W23 and W105, E.A. Hickok & Associates, Inc., 1982 to present.
- (19) Water samples and analyses by CH2M Hill, 1982 and 1983.
- (20) Water samples and analyses by Environmental Research and Technology, Inc., 1982 to present.
- (21) Water samples and analyses by Acurex Corporation, 1984 to present.
- (22) Water analyses by United States Environmental Protection Agency 1977 and 1981-1982.

APPENDIX B

**METROPOLITAN WASTE CONTROL COMMISSION
APPROVAL FOR SANITARY SEWER DISCHARGES**



RECEIVED
JAN 15 1987
ST. LOUIS PARK

January 14, 1987

James N. Grube
Director of Public Works
5005 Minnetonka Blvd.
St. Louis Park, MN 55416-2290

Dear Mr. Grube:

Your request for sewerage well purge water and excess well monitoring water at five (5) and possibly seven (7) additional well locations in St. Louis Park is approved for a period of one year. The discharges at the wells will occur at six month intervals. Volume of discharge at each site will total approximately 1000 gallons per event based on a pumping rate of 30 gpm. The purge/monitoring water will be rerouted to storm sewers or receiving waters if analyses indicate that contaminant levels meet surface water discharge standards. Reapplication for discharge approval is required if the monitoring events at any of the well sites extend beyond one year.

Semi-annual reports, commencing on January 1, 1987, shall be submitted to the MWCC detailing the following information for each discharge event.

1. Well location
2. Date of discharge
3. Volume of discharge
4. Contaminant analysis (PAH)

The MWCC may revoke this approval if negative impacts occur in the MDS, or if the approval conditions are not met.

If you agree to all terms and conditions of this approval please sign and date the signatory statement provided below:

I understand and accept all the conditions listed in this approval letter.

Signature

Date

Please return the original signed statement to the MWCC and retain the second statement for your records.

Sincerely,

Leo H. Hermes

Leo H. Hermes, P.E.
Industrial Waste Manager

LH:DS:js

cc: Douglas Robohm, MPCA

APPENDIX C
CONTINGENCY PLAN

Contingent Actions for Contaminated Soils

It is possible that soils contaminated with coal tar materials will be encountered during the well drilling operations. It is likely, however, that any contaminated soils will be thoroughly weathered, hence, it is unlikely that volatile or "runny" coal tar wastes or contamination will be encountered.

If any coal tar wastes or contaminated soils are encountered during excavation work, the Engineer or his representative will determine if the material is suitable for use as backfill based on the following visual determination:

Excavated material containing creosote or coal tar constituents may be used as backfill material if the creosote or coal tar constituents have not acquired a cementitious nature so as to artificially bond the excavated soil structure as a concrete unit and if the creosote or coal tar constituents are not encountered in a definable homogeneous mass of excessive concentration or amount sufficient to preclude heterogeneous mixing with uncontaminated soils from the excavation area.

Any contaminated materials suitable for backfill will be replaced in approximately its original location and covered with at least twelve inches of clean soil before final grading. Any contaminated soils that are not suitable for backfilling will be stockpiled at a temporary storage facility between West Lake Street and Highway 7 (see Figure I) until all of the work required for the well construction has been completed. The stockpiled material will then be disposed of in accordance with all applicable state and federal regulations at a RCRA hazardous waste treatment/storage/disposal (TSD) facility legally permitted to accept the material and approved by the Environmental Protection Agency and Minnesota Pollution Control Agency. The City will be responsible for said disposal activities.

The temporary storage facility is an area 100 feet by 100 feet surrounded by an eight-foot chain link fence with silt screening at the bottom (see Figure I). The facility is located in a large open field on fill material placed in a bog area that used to receive the wastewater discharge from the former Republic Creosoting plant on the Site. The temporary storage facility has adequate capacity to handle the maximum amount of contaminated materials that could be generated during the work described in these project specifications. Any contaminated materials stockpiled in the temporary storage facility will be covered with an impervious barrier and the two gates will be kept locked at all times, except when material is being added to or removed from the stockpile.

The City will be responsible for keeping the Environmental Protection Agency, Minnesota Pollution Control Agency and Reilly Tar & Chemical Corporation informed of all significant actions involving excavation and disposal of contaminated soils and use of the temporary storage facility. All actions, decisions and communications by the City, Environmental Protection Agency, Minnesota Pollution Control Agency, and Reilly in dealing with contaminated soils will be in accordance with and subject to the provisions of Parts I, J, and O of the Consent Decree in the Reilly settlement.

Contingent Actions for Contaminated Well Construction Materials

It is possible that solid and/or aqueous materials contaminated with creosote or coal tar constituents will be generated during the well construction work described in the project specifications. Any contaminated solids will be handled as excavated soils as described above, namely:

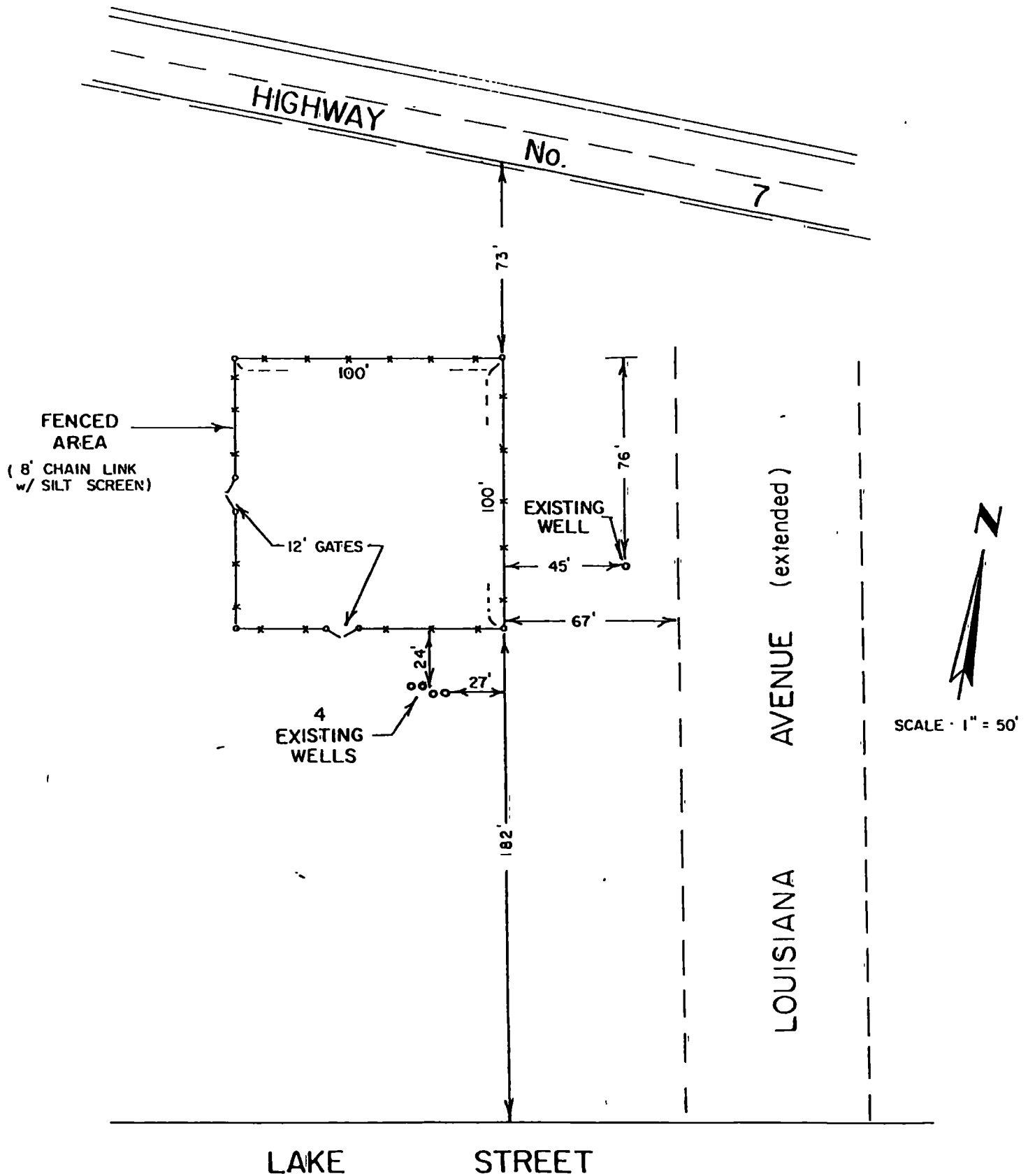
1. Contaminated solids suitable for use as backfill will be used as such;
2. Contaminated solids unsuitable for use as backfill will be stockpiled in the temporary storage area for subsequent disposal at a RCRA TSD facility.

Groundwater and drilling fluids generated during well construction work will be classified as contaminated if the water exhibits a discernible oil sheen or oil phase. Contaminated water will be pumped to the sanitary sewer if it contains less than ten percent organic material. Estimates of flow rate, disposal volume and water quality will be established and the Metropolitan Waste Control Commission (MWCC) will be informed before the discharge to the sanitary sewer if the estimated flow exceeds 150 gallons per workday. Contaminated liquids containing more than ten percent organic material or failing to receive MWCC approval for discharge will be disposed of in accordance with all applicable local, state and federal rules and regulations and Part T of the Consent Decree. Uncontaminated water will be disposed of in the storm sewer or by other means acceptable to the City of St. Louis Park.

Any use of the temporary storage facility for contaminated well construction materials will be as described above for contaminated soils.

The City will keep the Environmental Protection Agency, Minnesota Pollution Control Agency and Reilly informed of all significant actions involving the generation and disposal of contaminated well construction materials and use of the temporary storage facility. All actions, decisions and communications by the City, Environmental Protection Agency, Minnesota Pollution Control Agency, and Reilly in dealing with contaminated well construction materials will be in accordance with and subject to the provisions of Parts I, J and O of the Consent Decree.

FIGURE 1
TEMPORARY STORAGE FACILITY
FOR
CONTAMINATED MATERIAL



SCALE · 1" = 50'

SECTION B

QUALITY ASSURANCE PROJECT PLAN

ERT Document No. QAE317-600
ERT Disc No. 3 (QAE317-6)

**QUALITY ASSURANCE PROJECT PLAN
FOR THE DRIFT-PLATTEVILLE AQUIFER NORTHERN AREA
REMEDIAL INVESTIGATION**

ERT Document No. QAE317-600

December 1986

Amended January 1987

Amended October 1987

Prepared for:

**THE CITY OF ST. LOUIS PARK
St. Louis Park, Minnesota 55416**

**ERT - A RESOURCE ENGINEERING COMPANY
5871 Cedar Lake Road, St. Louis Park, Minnesota 55416**

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1.0 INTRODUCTION

1.1 Background

ERT and the City of St. Louis Park will complete certain tasks in fulfillment of the Consent Decree and Remedial Action Plan for the St. Louis Park Site. This Quality Assurance Project Plan pertains to all work to be performed by ERT and other contractors to install six new groundwater monitoring wells in the Drift-Platteville Aquifer. The new wells will be monitored along with a network of existing wells to determine the nature and extent of contamination in the aquifer. Monitoring data will be compared with historical water quality data and various water quality criteria for this purpose. The existing monitoring network is not adequate for determining the nature and extent of contamination, hence the need for the six additional wells. Further details on the work to be performed, its purpose and the methodology to be employed may be found in the Site Management Plan. The schedule for this work is to complete the well construction within 60 days of approval of this Plan and project specifications pursuant to Part G of the Consent Decree.

1.2 Quality Objectives

The purpose of this Quality Assurance Project Plan is to define the Quality Assurance and Quality Control provisions to be implemented to ensure that:

- o The new monitoring wells will conform to design and location specifications given in the Site Management Plan.**
- o The work is performed in an efficient manner.**
- o Field records generated during the course of the field work are complete and accurate.**
- o The objectives of the Consent Decree are met.**

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization is illustrated in Figure 2-1. The Project Manager, Mr. William Gregg will oversee and coordinate all project activities, schedule and direct all field activities and will conduct correspondence with St. Louis Park. The Project Manager/Field Coordinator is also responsible for maintaining records of the work performed on the project and for archiving those records in the Central File upon completion of the work. The Project Quality Assurance Officer is responsible for ensuring that this Plan is implemented and that project data undergo technical and peer review, as necessary. The U.S. EPA, MPCA, and MDH will have the opportunity to audit, comment on, or otherwise participate in Quality Control procedures, and inspect the work done on this project at any time. The drilling and well installation contractor will perform all work necessary to install the new monitoring wells.

3.0 QA/QC - FIELD ACTIVITIES

3.1 Training

All field personnel working on the Drift-Platteville Aquifer Northern Area Remedial Investigation (including subcontractors) will receive training on the purpose of the work, the procedures to be employed and the Project Health and Safety Plan.

3.2 Subcontractor Quality Control

Subcontractor quality control is that system of activities which ensures that products or services obtained from subcontractors fulfill the needs of the project.

Periodic quality control inspection of each contractor will be performed by the ERT Project Manager/Field Coordinator to evaluate adherence to the project QA Plan and the project Health and Safety Plan. Inspection will include (as appropriate):

- o Type and condition of equipment,**
- o Calibration procedures,**
- o Personnel qualifications,**
- o Decontamination procedures,**
- o Documentation,**
- o Level of personal protection**

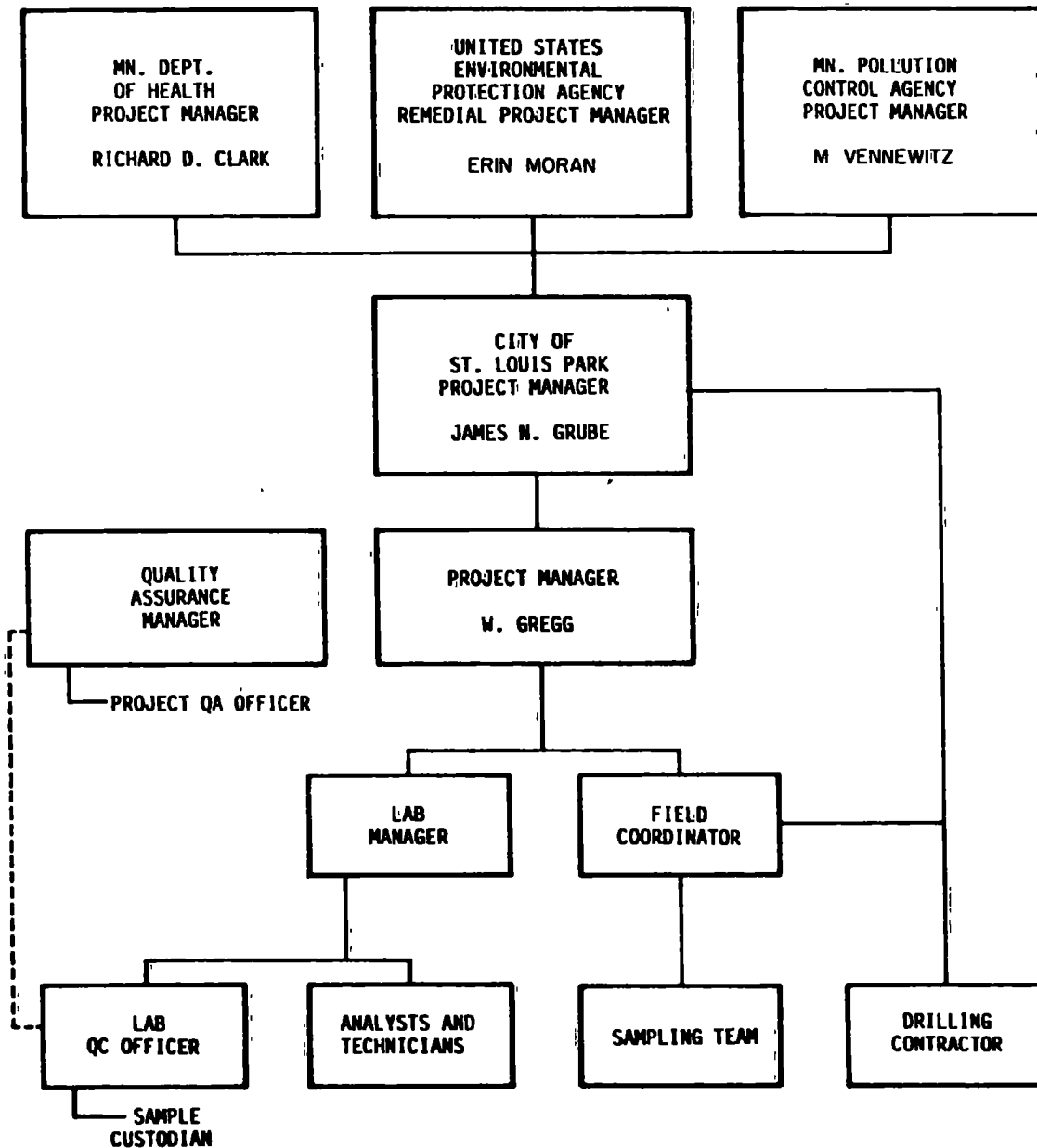


Figure 1-1 Project Quality Assurance Organization

Results of the inspection will be entered in the field notebook.

3.3 Document Control and Recordkeeping

Document Control for the remedial investigation serves a two-fold purpose. It is a formal system of activities that ensures that:

- 1) All participants in the project are promptly informed of revisions of the Quality Assurance Plan; and**
- 2) All critical documents generated during the course of the work are accounted for during, and at the end of the project.**

This QA Plan and all Standard Operating Procedure documents have the following information on each page:

- o Document number**
- o Page number**
- o Total number of pages in document**
- o Revision number**
- o Revision date**

When any of these documents are revised, the affected pages are reissued to all personnel listed as document holders with updated revision numbers and dates. Issuance of revisions is accompanied by explicit instructions as to which documents or portions of documents have become obsolete.

Control of, and accounting for documents generated during the course of the project is achieved by assigning the responsibility for document issuance and archiving. For the St. Peter Aquifer Remedial Investigation, the ERT Project Manager/Field Coordinator has this responsibility.

Documentation for the project will either be recorded in non-erasable ink, or will be photocopied promptly upon completion, and the photocopies dated. All documents will be signed by the person completing them.

QUALITY ASSURANCE PROJECT PLAN

Page: 5 of 5
Date: January 1987
Number: QAE317-600
Revision: 0

- 3.4 Final QA/QC measures will satisfy local, state, and federal criteria and the objectives of the RAP.

4.0 NUMERICAL ANALYSIS AND PEER REVIEW

All numerical analyses, including manual calculation, mapping, and computer modeling will be documented and subjected to quality control review in accordance with ERT SOP 2005, Numerical Analysis and Peer Review. All records of numerical analyses will be legible, reproduction-quality and complete enough to permit logical reconstruction by a qualified individual other than the originator.

5.0 AUDITS AND CORRECTIVE ACTION

ERT conducts periodic audits to assess the level of adherence to QA policies, procedures, and plans.

Whenever quality deficiencies are observed that warrant immediate attention, formal corrective action request forms are issued to the project manager by the Quality Assurance Department. The QA Department retains one copy of the form when it is issued. The Project Manager completes the form and signs it when corrective action has been implemented, and returns the original to the QA Officer to close the loop.

The Quality Assurance Department maintains a record of all corrective action requests and reports their status to ERT management in a quarterly report.

Should an audit be conducted on the Drift-Platteville Aquifer Northern Area Remedial Investigation work, St. Louis Park will be apprised of the audit findings and of any corrective action that is requested and performed.

6.0 FINAL CONSTRUCTION INSPECTION

The U.S. EPA and MPCA will perform a final construction inspection prior to usage of the monitoring wells.

SECTION C
HEALTH & SAFETY PLAN

HEALTH AND SAFETY PLAN

Introduction

This Health and Safety Plan applies to on-site personnel who will potentially be exposed to soil and/or groundwater affected by creosote or coal tar constituents during the construction of Drift and Platteville Aquifer monitor wells. This plan has been designated to comply with, as a minimum, the requirements set forth in 29 CFR 1910.120, the OSHA standards governing hazardous waste operations. In no case may work be performed in a manner that conflicts with the intent of or the safety concerns expressed in this plan. Other contractors and subcontractors involved in this project will be required to adhere to this plan as a minimum, and to conduct all work in accordance with applicable health and safety regulations, including 29CFR1910.120

Materials of Concern and effects of Overexposure

The materials of concern which have been identified at this site are coal tar and creosote related materials including naphthalene, other polynuclear aromatic hydrocarbons (PAH) and phenolic compounds.

Coal tar and creosote are typically irritating to the eyes, skin and respiratory tract. Acute skin contact may cause burning and itching while prolonged contact and poor hygiene practices may produce dermatitis. Prolonged skin contact with creosote must be avoided to prevent the possibility of skin absorption.

Naphthalene is a hemolytic agent which, upon overexposure to the vapor or ingestion of the solid, may produce a variety of symptoms associated with the breakdown of red blood cells. Naphthalene is also irritating to the eyes and repeated or prolonged contact has been associated with the production of cataracts.

Repeated exposure to certain PAH compounds has been associated with the production of cancer. Contact of PAH compounds with the skin may cause photosensitization of the skin producing skin burns after subsequent exposure to ultraviolet radiation.

Phenolics are generally strong irritants which can have a corrosive effect on the skin and can also rapidly penetrate the skin. Overexposure to phenols and phenolic compounds may cause convulsions as well as liver and kidney damage.

Hazard Assessment

Initial

Because of the relatively low vapor pressures associated with PAH compounds (generally less than 10^{-4} mm Hg at 20°C), they are not expected to present a vapor hazard at this site. The most likely threat of exposure to these compounds will be via skin contact.

Although naphthalene and phenol also have relatively low vapor pressures (0.05 and 0.36 mm Hg at 20°C, respectively) there is a possibility that these substances may produce vapor hazards at this site under adverse conditions.

Continuing Hazard Assessment On-Site

Air Monitoring

An HNU Photoionization Detector (PID) equipped with a 10.2 eV lamp will be used by the Engineer to provide semiquantitative data on VOC concentrations in and around the breathing zone of workers. The Engineer will conduct air sampling by taking and recording periodic readings in the breathing zone over freshly-exposed soil being excavated.

TABLE 1
ACTION LIMITS FOR AIR CONTAMINANTS

<u>Limit</u>	<u>Persistent Concentration in the Breathing Zone</u>	<u>Procedure</u>
Lower	5 ppm	Don respirators, step up monitoring.
Upper	50 ppm	Stop work and back off from immediate work area until levels subside in the breathing zone.

Action Limits

The American Conference of Governmental Industrial Hygienists (ACGIH) has established threshold limit values (TLV) for phenol and naphthalene at 5 and 10 ppm, respectively, as 8-hour time weighted averages (TWA). Based on these values, the action limits in Table 1 have been set. The lower limit of 5 ppm is based on the TLV for phenol while the upper limit of 50 ppm is based on a minimum protection factor of 10 for a half-mask, air purifying respirator.

Response

When the PID yields persistent breathing-zone readings at or above the lower action limit, workers in the affected area will don respirators. Air sampling will continue on a more frequent basis. If readings are persistent at or above the upper limit, workers shall back off from the immediate work area until measured breathing-zone concentrations fall below the lower limit, at which time operations will resume and normal air monitoring will continue. If breathing zone levels do not fall below the upper limit, workers are to leave the work area and report the condition immediately to the City, the Engineer, or its representative. If necessary, engineering controls will be instituted to maintain vapor concentrations below the upper limit or arrangements will be made to upgrade to Level B protection.

Personal Protective Equipment

Personal protective equipment (PPE) will be donned, as necessary, based on the hazards encountered. Listed below is the personal protective equipment to be utilized during this project and the conditions requiring its use.

Personal Protective Equipment

- Coveralls - Polyethylene coated Tyvek if work involves contact with affected soil or groundwater.
- Boots - Chemical resistant type if work involves contact with affected soil or groundwater.
- Hard Hat - When working in the vicinity of operating heavy machinery.
- Face shield - If splash hazard exists.
- Gloves - Nitrile for potential contact with affected soil or groundwater.
- Respirator - MSA Comfo II with GMC-H Cartridges if PID reading exceeds 5 ppm or if dust or odors become objectionable.
- Chemical Safety Goggles - If eye irritation occurs.

Because of the carcinogenicity of certain PAH compounds, and because of the skin hazards associated with PAH and phenolic compounds, it is important that appropriate protective clothing be worn during work activities, which may involve the possibility of skin contact with affected soil or groundwater. As a minimum, the presence of visible creosote or coal tar related material shall constitute evidence of affected soil or groundwater.

Health and Safety Training

Site personnel covered by this Health and Safety Plan must have received appropriate health and safety training prior to their working on the site. Training will include:

- Requirements for and use of respirators and personal protective equipment.
- Cautions regarding the potential for trench collapse.
- Required personal hygiene practices.
- Requirements for employees to work in pairs.
- Proper material handling.
- Proper sampling procedures.
- Maintenance of safety equipment.
- Effective response to any emergency.
- Emergency procedures (e.g., in the event of a trench collapse).
- Hazard zones.
- Decontamination methods.
- General safety precautions.

A copy of the Standard Safety Procedures (Table 2) will be given to each worker covered by this Health and Safety Plan.

Decontamination

Administrative procedures require hygienic practices consistent with work hazards. Employees will be instructed in the training program on proper personal hygiene procedures.

Contaminated, reuseable PPE, such as boots, hard hats, face shields and goggles, will be decontaminated prior to leaving the site. The decontamination procedure follows:

- Rinse with water to remove gross contamination.
- Wash in Alconox or equivalent detergent solution.
- Rinse with clean water.

Contaminated, disposable PPE, such as Tyvek coveralls and gloves will be placed in 55-gallon drums and stored on site while arrangements are made for disposal.

TABLE 2
STANDARD SAFETY PROCEDURES

- Employees are required to work in pairs.
- Wash face and hands prior to eating, smoking, or leaving the site.
- No smoking or eating is allowed in the work area during excavation or sampling activities.
- Wearing of contact lenses is not permitted in the work area.
- Contaminated material (e.g., Tyvek coveralls) must be properly disposed of before leaving the site.
- All work must be conducted in accordance with local, state and federal EPA and OSHA regulations, particularly 29 CFR 1910.120.
- The walls of trenches greater than 4 feet in depth must be sloped back to the angle of repose prior to entering. For average soil, an angle of 45° is recommended.

Respirators, if used, will be cleaned and disinfected after each day of use. The facepiece (with cartridge removed) will be washed in a hypochlorite (or equivalent) disinfecting solution, rinsed in warm water and air dried in a clean place.

Emergency Procedures

This Health and Safety Plan has been established to allow site operations to be conducted without adverse impacts on worker health and safety as well as public health and safety. In addition, supplementary emergency response procedures have been developed to cover extraordinary conditions at the site.

General

All accidents and unusual events will be dealt with in a manner to minimize a continued health risk to site workers. In the event that an accident or other unusual event occurs, the following procedure will be followed:

- First aid or other appropriate initial action will be administered by those closest to the accident/event. This assistance will be conducted so that those rendering assistance are not placed in a situation of unacceptable risk. In the event that a worker is caught in a trench collapse, call for emergency assistance immediately.
- All accidents/unusual events must be immediately reported to the Owner.
- All workers on site should conduct themselves in a mature, calm manner in the event of an accident/unusual event, to avoid spreading the danger to themselves, surrounding workers and the community.

Responses to Specific Situations

Emergency procedures for specific situations are given in the following paragraphs.

Worker Injury

If an employee in an affected area is physically injured, Red Cross first-aid procedures will be followed. Depending on the severity of the injury, emergency medical response may be sought. If an excavation collapses and a worker is caught, call for emergency assistance immediately. If the person is in no immediate danger, do not attempt to move him. Internal injuries could be worsened. If the employee can be moved, he will be taken to the edge of the work area (on a stretcher, if needed) where contaminated clothing (if any) will be removed, emergency first-aid administered, and transportation to a local emergency medical facility awaited.

If the injury to the worker is chemical in nature (e.g., overexposure), the following first-aid procedures are to be instituted:

- Eye Exposure - If affected solids or liquids get into the eyes, wash eyes immediately using large amounts of water and lifting the lower and upper lid occasionally. Obtain medical attention immediately.

- Skin Exposure - If affected solids or liquids get on the skin, promptly wash the affected skin using soap or mild detergent and water. Obtain medical attention immediately when exposed to concentrated solids or liquids.
- Inhalation - If a person inhales large amounts of a toxic vapor, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.
- Swallowing - When affected solids or liquids have been swallowed, the Poison Control Center will be contacted and their recommended procedures followed.

NO COMPENSATION WILL BE PROVIDED FOR SAFETY MEASURES TAKEN BY THE CONTRACTOR TO MEET THE REQUIREMENTS OF THIS HEALTH AND SAFETY PLAN.

SECTION D

COMMUNITY RELATIONS PLAN

COMMUNITY RELATIONS PLAN

The Drift-Platteville Aquifer - Northern Area Remedial Investigation is to be completed in conjunction with the enactment of various other work tasks embodied in a proposed Consent Decree - Remedial Action Plan for Reilly Tar, Minnesota, N.P.L. Site. All community relations programs related to the enactment of the Consent Decree tasks shall be coordinated through the following agencies:

United States

Ms. Judy Beck

**United States Environmental Protection Agency
(312) 353-1325**

State of Minnesota

Ms. Susan Brustman

**Minnesota Pollution Control Agency
(612) 296-7769**

City of St. Louis Park

Ms. Sharon Klumpp

**City of St. Louis Park
(612) 924-2523**

Information necessary to conduct the Community Relations Plan will be provided by the City and Reilly.

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FORT COLLINS, CO, (303) 493-8878
WASHINGTON, D.C., (202) 463-6378
LOMBARD, IL, (312) 620-5900
CONCORD, MA, (617) 369-8910
PITTSBURGH, PA, (412) 261-2910
DALLAS, TX, (214) 960-6855
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